United States Court of Appeals

for the

District of Columbia Circuit

TRANSCRIPT OF RECORD

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Court of Appeals of the District of Columbia

OCTOBER TERM, 1931

No. 5528

91

SPECIAL CALENDAR.

JAMES E. DAVIDSON (WBCM), APPELLANT,

vs.

THE FEDERAL RADIO COMMISSION, CONGRESS SQUARE HOTEL COMPANY, INTERVENER.

APPEAL FROM THE FEDERAL RADIO COMMISSION.

FILED OCTOBER 21, 1931.

PRINTED JANUARY 12, 1932.

Court of Appeals of the District of Columbia

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JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., DECEMBER 15, 1931.

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Court of Appeals of the District of Columbia

No. 5528.

James E. Davidson (WBCM), Appellant,

vs.

The Federal Radio Commission; Congress Square Hotel Company, Intervener,

1 In the Court of Appeals of the District of Columbia.

October Term, 1931.

No. 5528.

Federal Radio Commission Docket, No. 1152.

James E. Davidson (WBCM), Applicant-Appellant,

vs.

The Federal Radio Commission.

Notice of Appeal to the Court of Appeals of the District of Columbia and Reasons Therefor.

Now comes James E. Davidson, the applicant-appellant in the above-entitled proceeding, and says that he is aggrieved by the decision of the Federal Radio Commission rendered herein on October 2nd, 1931, effective the same date, and gives notice of his appeal therefrom to the Court of Appeals of the District of Columbia, assigning in support thereof the following:

Reasons for Appeal.

Preliminary Statement.

This appeal arises from an order of the Federal Radio Commission filed October 2nd, 1931, by which it was ordered:

(1) That the request of James E. Davidson (WBCM), for oral argument before the Commission, be, and the same is hereby, denied:

(2) That the exceptions filed by James E. Davidson (WBCM), to the report of the Examiner, be, and the same are hereby, overruled; and

2 (3) That the application of James E. Davidson (WBCM), for modification of station license, be, and the same is hereby, denied.

The appellant applied for a modification of his radio broadcasting license from the 1410 kc. frequency, 500 watts, unlimited time, to the 940 kc. frequency, 500 watts, unlimited time.

The purpose of the appellant in seeking a reassignment to the 940 kc. frequency was to "measurably reestablish appellant in the position occupied by it prior to the acts complained of" by obtaining from the Commission a maximum restoration of his former service area with a minimum of disturbance to the present system of broadcasting allocations.

The licensing and allocation by the Commission of seven additional broadcasting stations to the 1410 kc. frequency without notice and without opportunity to the appellant to be heard has cut his service area to a fraction of that enjoyed by the Station for a period following December 8, 1928.

The appellant has suffered a substantial and unwarranted deprivation of his broadcasting facilities causing damage and injury to a large investment made in reliance upon a continuance of the authorized facilities.

Appellant's existing license authorizes appellant to operate appellant's broadcasting Station, WBCM (with transmitter on Tuscola Road and main studio in the Wenonah Hotel, Bay City, Michigan), full time on the frequency of 1410 kilocycles, with 500 watts power, unlimited time.

3 Appellant has been, and is using within the limits permitted by its present license a standard Western Electric Transmitter of the most modern and efficient type, installed pursuant to construction permit issued to appellant during the summer of 1928. No question has been raised by the Commission, and, so far as appellant knows, no question will be raised by the Commission on this appeal, as to the excellent record of appellant's Station, WBCM, or as to the excellent program service now and at all times heretofore rendered by the Station, or as to the modern efficiency and high technical standard of its equipment, or as to ap-

pellant's financial and program resources, or as to the fact that if any station in the State of Michigan is entitled to a restoration of its former service area or an adequate reassignment, it is appellant's station.

Appellant's application for modification of license was given the file number 2-M-B-521, and was thereafter designated for hearing as Docket No. 1152. A hearing was held on April 24, 1931, before an Examiner of the Commission. On July 15, 1931, the Examiner submitted his report (No. 224) denying the application for modification of license. On July 31, 1931, appellant filed his exceptions to the Examiner's report with request for oral argument. On October 2, 1931, the Commission rendered its decision as set forth above. Appellant's reasons for appealing from the decision are as follows:

1. The decision of the Commission is erroneous in that the use of the 940 kilocycle channel is necessary to restore the service area of this station to the extent and character of excellence which it enjoyed prior to the Commission's
4 unlawful, arbitrary and capricious actions in assigning seven additional stations to its present frequency of 1410 kilocycles, and in increasing the power of stations assigned to the adjacent frequency of 1420 kilocycles, all without giving notice or opportunity for hearing to appellant, in disregard of the provisions of Section 11 of the Radio Act of 1927 and of the Commission's own regulations, in violation of appellant's rights to hold its assigned service area against subsequent applicants for assignment to the same frequency, in violation of the requirements of the second paragraph of Section 9 of the Radio Act of 1927, as amended by Section 5 of the Act approved March 28, 1928, and in the face of probable interference to appellant's station and consequent reduction of its service area caused by reason of said assignments.

2. The decision of the Commission is erroneous and highly prejudicial to the appellant in that the Commission, subsequently to the general reallocation of November 11, 1928, has reduced the appellant's service area approximately 90% by the subsequent allocation to the appellant's frequency of seven additional stations without notice to appellant and without opportunity for him to be heard in opposition thereto.

3. The decision of the Commission is erroneous in that it
violates the second paragraph of Section 9 of the Radio Act
of 1927 as amended by Section 5 of the Act approved March
28, 1928, known as the Davis Amendment, providing for
equality of radio broadcasting service, both of trans-
5 mission and of reception for the people of all the
zones.

4. The decision of the Commission is erroneous in that it has deprived the people of the State of Michigan of satisfactory broadcasting service without due process of law.

5. The decision of the Commission is erroneous, arbitrary, and capricious, in that the appellant in good faith has constructed and equipped Station WBCM at a cost of $75,000, and is operating and maintaining said Station at a cost of $72,000 a year, and by the action of the Commission has suffered a reduction of its normal and established service area to a fraction of its former size, and that said deprivation of facilities has been effected without notice to the appellant, without opportunity to be heard in opposition to the successive encroachments, and without any showing by the Commission as to compelling reasons for such encroachments.

6. The decision of the Commission is erroneous in that it rests on an interpretation of public interest, convenience and/or necessity contrary to law.

7. The conclusion of the Commission that the granting of this application would not serve public interest, convenience and/or necessity is manifestly against the evidence.

8. The finding of the Commission that, while it appears that the present service area of applicant station is somewhat affected by interference, operation as requested would not result in any material improvement in service area, is manifestly against the evidence.

6 9. The finding of the Commission, that, if this application were granted, objectionable interference would result from the simultaneous operation of the applicant station as proposed and stations now operating on the requested frequency, is manifestly against the evidence.

10. In so far as the decision of the Commission is based on the provisions of its General Order No. 40, the decision is erroneous in that said order is invalid and contrary to public interest, convenience and/or necessity.

11. The Commission's decision in denying the exceptions and request for oral argument duly filed by the appellant is arbitrary, unreasonable and capricious, and is therefore contrary to the law.

12. The said decision of the Commission is contrary to public interest, convenience and/or necessity in that it will deprive a large listening public of desirable broadcasting service.

13. The action of the Commission is confiscatory and constitutes a taking of appellant's property without due process of law, contrary to the provisions of the Fifth Amendment.

14. The said decision of the Commission arbitrarily and unreasonably deprives appellant of a legitimate, established business contrary to the provisions of the Fifth Amendment.

15. The decision of the Commission is erroneous in that it is based upon facts not a part of the record made on the appellant's application, of which facts the appellant
7 had no knowledge or notice or opportunity for cross-examination of witnesses.

16. The decision of the Commission errs in that it fails to give any consideration to the interference caused by the increase of power to Station WMBC, Detroit, on the adjacent frequency of 1420 kilocycles.

Wherefore James E. Davidson has appealed to this Court and prays that judgment be entered reversing the decision of the Commission, and requiring the Commission to grant forthwith the modification of license applied for to "measurably reestablish appellant in the position occupied by it prior to the acts complained of," together with such further order in the premises as to the Court shall seem just.

JAMES E. DAVIDSON,
By CHARLES H. LeFEVRE,
HOWARD S. LeROY,
Attorneys for Appellant.

LeFEVRE & LeROY,
723-725 *Fifteenth Street N. W.,*
Washington, D. C.

8 District of Columbia, *ss:*

Howard S. LeRoy, being first duly sworn, deposes and says that he is one of the attorneys for the Applicant-appellant James E. Davidson; that he has read the foregoing notice of appeal and reasons therefor; that the matters and things therein set forth are true except such as are therein stated to be upon information and belief, and that with respect to such matters he verily believes them to be true.

HOWARD S. LeROY.

Subscribed and sworn to before me this 21st day of October, 1931.

[Seal of C. Ell Wills, Notary Public, District of Columbia.]

C. ELL WILLS,
Notary Public.

9 To the Federal Radio Commission,
Washington, D. C.:

Please take notice that the foregoing notice of Appeal and the Reasons for Appeal will be filed forthwith in the Court of Appeals for the District of Columbia pursuant to the provisions of the Radio Act of 1927 as amended.

HOWARD S. LeROY,
Attorney for Applicant-Appellant.

Date: October 21, 1931.

Service of copy of the foregoing notice of Appeal and Reasons therefor is acknowledged this the 21st day of October, 1931.

FEDERAL RADIO COMMISSION,
By JAMES W. BALDWIN.
D.

10 Personally appeared before me, C. Ell Wills, a Notary Public in and for the District of Columbia, Howard S. LeRoy, who first being sworn on oath deposes and says that he is attorney for the applicant-appellant herein, and that the foregoing is a true copy of the notice of Appeal and reasons for Appeal to be filed forthwith in the Court of Appeals of the District of Columbia.

[Seal of C. Ell Wills, Notary Public, District of Columbia.]

C. ELL WILLS,
Notary Public, D. C.

October 21, 1931.

11 [Endorsed:] In the Court of Appeals of the District of Columbia. No. —. James E. Davidson (WBCM), Applicant-Appellant, vs. The Federal Radio Commission. Federal Radio Commission Docket No. 1152. Notice of Appeal to the Court of Appeals of the District of Columbia and Reasons Therefor. Note: Clerk please file. Howard S. LeRoy. LeFevre & LeRoy, Attorney- and Counsellor- at Law, Hibbs Building, 725 Fifteenth Street, Washington, D. C.

12 In the Court of Appeals of the District of Columbia.

No. 5528.

James E. Davidson (WBCM), Appellant,

v.

Federal Radio Commission, Appellee.

Notice of Intention of Congress Square Hotel Company to Intervene.

Now comes Congress Square Hotel Company and gives notice that it intends to intervene in this case, and that it is an interested party and entitled to participate in the proceedings to be had upon this appeal.

CONGRESS SQUARE HOTEL COMPANY,
By BETHUEL M. WEBSTER, Jr.,
BETHUEL M. WEBSTER, Jr.,
PAUL M. SEGAL,
PAUL M. SEGAL,
Its Attorneys.

13 *Verified Statement Showing the Nature of Interest of Intervener.*

Washington,
District of Columbia, ss:

Paul M. Segal, being upon his oath duly sworn says he is one of the attorneys for Congress Square Hotel Company; and that:

Said Company has its principal place of business at Portland in the State of Maine, and none of the officials thereof resides within the District of Columbia or is now present therein.

The following are the facts showing the nature of the interest of intervener in this appeal:

Congress Square Hotel Company is the licensee from the Federal Radio Commission of WCSH, operating on the frequency of 940 kilocycles, with power of 1000 watts at Portland, Maine. Its station represents a large capital investment and renders a highly satisfactory and excellent service to a large listening audience.

The present appellant, who resides at Bay City, Michigan, 680 miles from intervener's station, operates WBCM on the frequency 1410 kilocycles, with power of 500 watts. Appellant made application to the Federal Radio Commission for modification of his station license to permit him to operate with 500 watts and upon the frequency used by intervener, 940 kilocycles. This application was designated for hearing and hearing was held before an Examiner, at which hearing it appeared in evidence that the granting of appellant's application would cause intolerable interference within the service area of intervener's station. For this and other reasons the Examiner recommended that appellant's application for modification of license be denied and in pursuance of said recommendation the Commission, October 2, 1931, denied the application.

14 The reversal of the Commission's decision by this Court would require the granting of the application and would result in intolerable interference with the service now effectively rendered by intervener.

PAUL M. SEGAL.
PAUL M. SEGAL.

Subscribed and sworn to before me, a Notary Public in and for the District of Columbia, this 30th day of October, 1931.

My commission will expire January 20, 1933.

[Seal of Richard A. Mahar, Notary Public, District of Columbia.]

RICHARD A. MAHAR,
RICHARD A. MAHAR,
Notary Public.

Proof of Service.

We acknowledge service of true copies of the foregoing notice and statement this 31st day of October, 1931.

HOWARD S. LeROY,
HOWARD S. LeROY,
Attorney for Appellant.
D. M. PATRICK,
General Counsel, Federal Radio Commission.

15 [Endorsed:] In the Court of Appeals of the District of Columbia. No. 5528. James E. Davidson (WBCM), Appellant, v. Federal Radio Commission, Appellee. Notice of intention of Congress Square Hotel Company to intervene. Court of Appeals, District of Columbia. Filed Oct. 31, 1931. Henry W. Hodges, Clerk.

16 In the Court of Appeals of the District of Columbia.

No. 5528.

James E. Davidson (Station WBCM), Appellant,

v.

Federal Radio Commission.

Federal Radio Commission's Statement Listing Interested Parties.

In compliance with the provisions of Section 16 of the Radio Act of 1927, as amended by Public Law No. 494, approved July 1, 1930, the Federal Radio Commission lists herewith all persons, firms or corporations to whom it has mailed or otherwise delivered a copy of the Notice of Appeal filed in the above entitled cause.

Call letters.	Licensee.
WDAY	WDAY, Incorporated, 117 Broadway, Fargo, N. D.
WHA	University of Wisconsin, Madison, Wisconsin.
WFIW	WFIW, Incorporated, Campbell & 17th Streets, Hopkinsville, Kentucky.
WCSH	Congress Square Hotel Co., 579 Congress St., Portland, Maine.

Call letters.	Licensee.
WWJ	The Evening News Assoc'n, Inc., 615 W. Lafayette Blvd., Detroit, Michigan.
WJBK	James F. Hopkins, Inc., 12897 Woodward Avenue, Highland Park, Michigan.
WELL	Enquirer-News Co., 38 W. State Street, Battle Creek, Michigan.
WJR	The Goodwill Station, Inc., 2800 Fisher Building, Detroit, Michigan.
WMBC	Michigan Broadcasting Co., Woodward & Adelaide Streets, Detroit, Michigan.
WASH	WASH Broadcasting Corp., Peninsular Building, Grand Rapids, Michigan.
17	
WOOD	Walter B. Stiles, Inc., Watson Building, Grand Rapids, Michigan.
WIBM	WIBM, Incorporated, c/o C. L. Carrell, 17 W. 64th Street, New York City.
(New)	Marius Johnson, Prop., D/B as Johnson Music Store, 124 W. Aurora Street, Ironwood, Mich.
(New)	The State Journal Company, 200 N. Grand Avenue, Lansing, Michigan.
(New)	Harold F. Gross, 16-A-Strand Arcade, Lansing, Michigan.
(New)	Harold E. Warren & Kenneth C. Retzlaff, Layman Street, R. F. D. #1, Muskegon, Mich.
(New)	Geo. W. Tripp & J. N. Tucker, 16 W. Huron Street, Pontiac, Michigan.
WBEO	Chas. C. MacLeod, 109 Fifth Street, Calumet, Michigan.
(New)	Theodore Frank Zemla, Riker Bldg., Pontiac, Michigan.
(New)	Owosso Broadcasting Company, Inc., Masonic Temple, Owosso, Michigan.

FEDERAL RADIO COMMISSION,
By JAMES W. BALDWIN,
Secretary.

18 [Endorsed:] No. 5528. In the Court of Appeals of the District of Columbia. James E. Davidson (WBCM), Appellant, v. Federal Radio Commission. Fed-

eral Radio Commission's statement listing interested parties. Federal Radio Commission. Thad H. Brown, General Counsel. Court of Appeals, District of Columbia. Filed Nov. 5, 1931. Henry W. Hodges, Clerk.

19 In the Court of Appeals of the District of Columbia.

No. 5528.

JAMES E. DAVIDSON (Station WBCM), Appellant,

v.

FEDERAL RADIO COMMISSION.

Statement in Writing of the Facts and Grounds for the Decision of the Federal Radio Commission as Found and Given by it, Order of the Federal Radio Commission and Record in the Matter of the Application of James E. Davidson (WBCM) for Modification of Station License as Amended.

Comes now the Federal Radio Commission, pursuant to Section 16 of the Radio Act of 1927, as amended by Public Law No. 494, approved July 1, 1930, and files this, its Statement in Writing of the Facts and Grounds for Decision as found and given by it, its Order, and the Record before it on the hearing of the application of James E. Davidson (Station WBCM) for modification of station license as amended.

FEDERAL RADIO COMMISSION,
By JAMES W. BALDWIN,
Secretary.

20 In the Court of Appeals of the District of Columbia.

No. 5528.

JAMES E. DAVIDSON (Station WBCM), Appellant,

v.

FEDERAL RADIO COMMISSION.

Index to Record.

1. Application of James E. Davidson for modification of station license, dated February 15, 1930.
2. Amendment to application of James E. Davidson for modification of station license.

3. Notice dated March 27, 1931, from the Commission to James E. Davidson of designation for hearing April 23, 1931, of application for modification of station license as amended.

4. Appearance and statement of James E. Davidson.

5. Transcript of hearing held April 24, 1931, on the application of James E. Davidson for modification of station license as amended.

A. Applicant's Exhibits:

No. 1, being a schedule of programs of Station WBCM for week of April 19, 1931.

No. 2, being a map of the State of Michigan purporting to show present and former service of Station WBCM.

No. 3, being a map purporting to show stations and separation on 940 kc.

No. 4, being a survey of interference on 940 kc.

No. 5, being a survey of interference on 1410 kc.

B. WCSH's Exhibits:

No. 1, being a field test map.

No. 2, being population and field strength maps.

Nos. 3 and 4, being Programs of WCSH.

21 6. General Order No. 93 of the Commission.

6-a. General Order No. 40 of the Commission.

7. List of broadcasting stations by States and Zones.

8. Examiner's Report No. 224.

9. Applicant's Exceptions to Examiner's Report.

10. Statement of Facts, Grounds for Decision and Order of the Commission.

11. Certificate of the Secretary of the Federal Radio Commission.

22 Form No. 13.

2-M-B-521.

(To be filled in by the Federal Radio Commission:)
Modification File No.: —. Station License File No.: —. Call Letters: WBCM. Frequency: —. Power: —. Official Number: 312.

UNITED STATES OF AMERICA:

Federal Radio Commission.

Application for Modification of Station License.

(Submit in duplicate to District Supervisor of Radio in charge of district in which station is located. Swear to one copy.)

To the Federal Radio Commission:

1. Name of applicant: James E. Davidson.

2. Post office address: State, Michigan; City, Bay City; Street, Center; Number, ——.

3. Nature of modification:

Terms of Present License.	*Modification Requested.*
A. Frequency: 1410 Kcs.	A. Frequency: 920 Kcs.
B. Power: 500 Watts.	B. Power[1]: 1000 Watts.
C. Hours of operation: 8:00 A. M. to Midnight continuously.	C. Hours of operation: 8:00 A. M. to midnight continuously.
D. Location of transmitter: Hampton township.	D. Location of transmitter: Hampton Township.
E. Location of main studio: Wenonah Hotel, Bay City, Mich.	E. Location of main studio: Wenonah Hotel, Bay City, Mich.
F. Call letters: WBCM.	F. Call letters[2]: WBCM.
G. ——.	G. ——.

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[1] If construction of a new transmitter is contemplated, application for construction permit must be filed.

[2] Call letters are designated by the Secretary of Commerce. Any request for change will be submitted to him by the Commission.

23 4. How will the granting of the application serve public interest, convenience, or necessity? At present WBCM is furnishing the listeners with what we consider the highest type of entertainment broadcast by any Michigan Station. The programs consist almost entirely of chain features with no objectionable commercial announcements included to detract from the entertainment value of the programs. Our present frequency of 1410 kilocycles does not cover Michigan satisfactorily due in part to local peculiarities and partially to the heterodyne of other stations on our wavelength. From past experiences we know that 920 kilocycles would be much more satisfactory than the present arrangement.

5. The applicant's last application for a station license is to be considered as part of this application, and the truth of the statements therein contained is hereby reaffirmed

except in so far as the contrary expressly appears in this application.

6. The applicant waives any claim to the use of any particular frequency or wave length or of the ether as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests a station license in accordance with this application.

Dated this — day of ——, 19—.

STANLEY F. NORTHCOTT,
Agent of James E. Davidson, Applicant.

STATE OF MICH.,
County of Bay, ss:

Stanley F. Northcott, being first duly sworn, upon his oath deposes and says that he is the (If applicant is not an individual, insert "agent of") agent of above-named applicant and that the statements in the foregoing application are true of his own knowledge, except as to such statements as are therein stated to be on information and belief, and as to such statements applicant believes them to be true.

STANLEY F. NORTHCOTT.

Subscribed and sworn to before me this 15th day of February, 1930.

ALBERT R. MAIRE,
Notary Public.

(Here follows photostat of side folio 24.)

25 *Radio Supervisor's Report.*

Application received February 17, 1930, at Detroit. Forwarded to Washington Feb. 18, 1930.

Remarks (state any pertinent facts): Forwarded for the attention of the Federal Radio Commission.

Applicant requests modification of present license for station WBCM to cover proposed changes in frequency and power, this application to be considered by the Federal Radio Commission only if station WWJ is granted 1020 kc. channel.

Radio Broadcasting Station

WBCM

[illegible] F. Northcott
[illegible]

Ralph H. Carpenter
[illegible] Engineer

Robert [illegible]
[illegible]

"Where the Summer Trails Begin"

OWNED AND OPERATED BY

Bay City Broadcasting Association

Associated Station of Columbia Broadcasting System, Incorporated

Karl J. Lamoreaux
Mgr. Commercial Dept.

Lionel [illegible]
Musical Director

Main Studios
Wenonah Hotel

Bay City, Michigan
February 15, 1930.

Mr. S W Edwards.,
Supervisor of Radio.,
2909 David Stott Bldg.,
Detroit Michigan.

Dear Sir:

Enclosed you will find application blanks for modification of the station license of W B C M. You will also find another copy of this letter and we would appreciate it greatly if you would send it with the applications to the Federal Radio Commission as an explanatory statement telling why we request the changes enumerated in these applications.

We notice that Station W W J at Detroit has requested an increase in power from 1 to 50 Kw., and the frequency changed from 920 to 1020 kilocycles. We wish the enclosed application to be considered by the Federal Radio Commission, only if W W J is granted the 1020 channel. We appreciate the difficulties the Federal Radio Commission has to contend with and do not wish to complicate matters unnecessarily, so we request that this application be considered only if W W J is authorized to broadcast on 1020 kilocycles.

Yours very truly,

Stanley F. Northcott
Manager of W B C M

SFN/h
encl.

The changes proposed may be accomplished with the station's existing transmitter, without change in the tube complement.

Respectfully,

J. E. BROWN,
Act. U. S. Supervisor of Radio.

JEB/MM.

Department of Commerce, Radio Division. Received Feb. 20, 1930.

26 Federal Radio Commission, Washington, D. C.

Application 2-M-B-521, 920 kc. Frequency.

In re Application of BAY CITY BROADCASTING ASSOCIATION, Station WBCM, Bay City, Michigan.

Motion to Amend Application.

Now comes the Applicant, Bay City Broadcasting Association, owner and operator of Station WBCM, Bay City, Michigan, by its Attorney, Howard S. LeRoy, 400 Hibbs Building, Washington, D. C., and respectfully moves:

1. That in view of the report of Mr. Examiner Yost, submitted February 16, 1931, and supplemental to his report No. 40, reaffirming his disallowance of the application of Station WWJ of Detroit for removal from the 920 kilocycle; and in view of the probable continuance of Station WWJ on the 920 kilocycle channel in close proximity to Station WBCM, the applicant herein moves that its pending application be amended in accordance with the provisions of Subtitle B, Section 14, of General Order No. 93 in the following respects:

a) That the frequency of 920 kilocycles be amended to the frequency of 940 kilocycles.

b) That the power requested be amended from 1 kilowatt to 500 watts.

27 2. That the applicant's hearing on the amended application be set for as early a date as the present

state of the hearing docket may permit, and that the applicant may be promptly notified of said date.

BAY CITY BROADCASTING ASSOCIATION,
STATION WBCM,
By HOWARD S. LeROY,
Its Attorney.

March 7, 1931.

LeFEVRE & LeROY,
400-2 *Hibbs Building,*
Washington, D. C.

28 4246.

Federal Radio Commission, Washington, D. C.

File No. 2-M-B-521.

In re Application of JAMES E. DAVIDSON, dated 2/15/30, for Modification of License. Location: Bay City, Michigan. Operating Assignment Specified: Frequency, 940 Kc.; Power, 500 W.; Hours of Operation, Unlimited.

Notice.

To —— ——:

You are hereby notified that the Commission has examined the above described application and not being satisfied that the public interest, convenience or necessity would be served by the granting thereof has designated the matter for hearing:

(1) The granting of this application may result in interference on this and adjacent frequencies.

(2) Other related applications are pending before the Commission.

The attention of the applicant is directed to the fact that while his application constitutes a part of the record, it is not a part of the testimony and he should be prepared, at the hearing, to introduce testimony to prove the allegations contained in his application.

The specific grounds mentioned are not to be considered as exclusive of other grounds for the action and eventual decision of the Commission.

29 The Commission has fixed a time and place for a hearing on said application on April 23, 1931, at the

hour of 10 A. M., at the offices of the Commission, Washington, D. C., subject to the rules and regulations set forth in General Order No. 93.

Your special attention is invited to Subtitle B, Section 7, Paragraph (2) of this order, which reads — follows:

> "In order to avail himself of the opportunity to be heard, the applicant shall, within 20 days of the mailing of the notice by the Secretary, file with the Commission a written appearance consisting of a statement of his desire to be heard, together with a statement in writing of the facts which he expects to prove at such hearing and an affidavit showing that a copy of such written statement has been served upon or mailed to all other parties notified of the hearing."

Notices of the hearing in this matter are being mailed to the following parties under date of March 25, 1931:

James E. Davidson (WBCM), Applicant, 1710 Center Ave., Wenonah Hotel, Bay City, Michigan.

WDAY, Incorporated (WDAY), 117 Broadway, Fargo, N. Dak., Station assigned to 940 kc. frequency.

University of Wisconsin (WHA), N. Charter Street, Madison, Wis., Station assigned to 940 kc. frequency.

WFIW, Incorporated (WFIW), Campbell & Seventeenth Sts., Hopkinsville, Ky., Station assigned to 940 kc. frequency.

Congress Square Hotel Co. (WCSH), 579 Congress Street, Portland, Me., Station assigned to 940 kc. frequency.

The Evening News Assn., Inc. (WWJ), 615 W. Lafayette Blvd., Detroit, Michigan, Station assigned to 920 kc. frequency.

James F. Hopkins, Inc. (WJBK), 12897 Woodward Ave., Highland Park, Mich., Station assigned to 1370 kc. frequency.

Enquirer-News Co. (WELL), 38 W. State Street, Battle Creek, Mich., Station assigned to 1420 kc. frequency.

WJR, The Goodwill Station, Inc. (WJR), 2800 Fisher Building, Detroit, Michigan, Station assigned to 750 kc. frequency.

Michigan Broadcasting Co. (WMBC), Woodward & Adelaide St., Detroit, Mich., Station assigned to 1420 kc. frequency.

WASH Broadcasting Corp. (WASH), Peninsular Building, 154 Louis Street, Grand Rapids, Mich., Station assigned to 1270 kc. frequency.

Walter B. Stiles, Inc. (WOOD), Watson Bldg., 108 E. Fulton St., Grand Rapids, Mich., Station assigned to 1270 kc. frequency.

WIBM, Incorporated (WIBM), % C. L. Carrell, 17 W. 64th St., New York, N. Y., Station assigned to 1370 kc. frequency.

30 Marius Johnson, Prop. (New), d/b as Johnson Music Store, 124 W. Aurora Street, Ironwood, Mich., Applicant for permit for station to operate on 1420 kc. frequency.

The State Journal Co. (New), 200 N. Grand Ave., Lansing, Mich., Applicant for permit for station to operate on 1200 kc. frequency.

Harold F. Gross (New), 16-A- Strand Arcade, Lansing, Mich., Applicant for permit for station to operate on 570 kc. frequency.

Harrold E. Warren & Kennith C. Retzlaff (New), Layman Street, R. F. D. #1, Muskegon, Mich., Applicant for permit for station to operate on 1500 kc. frequency.

Geo. W. Tripp & J. N. Tucker (New), 16 W. Huron Street, Pontiac, Mich., Applicant for permit for station to operate on 1500 kc. frequency.

Chas. C. MacLeod (WBEO), 109 Fifth Street, Calumet, Mich., Station assigned to 1310 kc. frequency.

Theodore Frank Zemla (New), Riker Bldg., W. Huron Street, Pontiac, Mich., Applicant for permit for station to operate on 1210 kc. frequency.

Owosso Brdcstg. Co., Inc. (New), Masonic Temple, Owosso, Mich., Applicant for permit for station to operate on 950 kc. frequency.

If for any reason the applicant does not desire a hearing, he should notify the Secretary immediately so that notices sent to other parties may be cancelled.

FEDERAL RADIO COMMISSION,
JAMES W. BALDWIN,
JAMES W. BALDWIN,
Secretary.

MBA/res.

Signed for above. Mailed by Mail and Files Mar. 27, 1931.

31 Federal Radio Commission. Received Apr. 13, 1931.
James W. Baldwin, Secretary.

Before the Federal Radio Commission, Washington, D. C.

File No. 2-M-B-521.

In re Application of James E. Davidson, Dated February 15, 1930, for Modification of License. Location: Bay City, Michigan. Operating Assignment Specified: Frequency, 940 Kc.; Power, 500 W.; Hours of Operation: Unlimited.

Appearance and Statement.

James E. Davidson, owner and operator of Radio Broadcasting Station WBCM of Bay City, Michigan, by his attorneys, Le Fevre & Le Roy, Hibbs Building, Washington, D. C., files this appearance and statement under Subtitle B, Section 7, Paragraph (2) of General Order No. 93 and shows:

1. That applicant has received a notice of hearing from the Secretary of the Federal Radio Commission mailed under date of March 25, 1931, and fixing April 23, 1931, at 10:00 A. M. at the offices of the Commission, Washington, D. C., as the time and place for hearing on his amended application dated February 15, 1930, for Modification of License from unlimited time on a frequency of 1410 kilocycles with an authorized power of five hundred watts to unlimited time on a frequency of 940 kilocycles with authorized power of five hundred watts. 32

2. That the applicant herein desires to be heard in support of said application and files this his formal appearance and statement conformably to the rules and regulations of the Commission.

3. That facts which the applicant expects to prove may be summarized as follows:

a) Station WBCM and its predecessor in interest have been operating since June 15, 1925.

b) The applicant's station represents a large capital investment.

c) On Nov. 11, 1928, when applicant was assigned present frequency, seven other stations were operating on 1410 kilocycle channel without seriously restricting applicant's service area.

d) For a year following Nov. 11, 1928, applicant's service area covered a large part of Central and Northeastern Michigan, including a large population in neighboring cities and vicinity.

e) At all times referred to herein, the applicant has served public interest, convenience and necessity by furnishing to its listeners the highest quality of broadcasting service.

f) In reliance upon then existing conditions applicant increased its investment, equipment, type of program, operating time and cost of maintenance.

33 g) Since Nov. 11, 1928, Commission, without notice to applicant, has authorized seven additional stations to operate on 1410 kilocycle channel.

h) Commission has granted an increase in power to WMBC of Detroit on 1420 kilocycle channel.

i) As a consequence of successive grants of increased facilities to other licensees on the same channel and the resulting heterodyne and cross talk interference, applicant's investment is jeopardized by the constriction of its service range to a small fraction of its former service area.

j) The applicant plans to take whatever steps may be necessary to insure that the future service of the Station shall continue of the highest quality as regards program and abreast of all the developments in the art as regards transmission.

k) Public interest, convenience, and necessity require that applicant should be given a frequency allocation that will restore to its large radio audience a high quality and interference-free service.

l) An allocation to the 940 kilocycle channel would reestablish the applicant's service area in Central and Northeastern Michigan and cause no substantial interference to existing stations on that channel.

m) The granting of this application will be in the public interest, convenience, and necessity.

34 n) And such further facts as the preparation of the case make pertinent to the issues.

JAMES E. DAVIDSON,
By HOWARD S. LeROY,
Applicant's Attorney.

April 14, 1931.

Counsel:
LeFEVRE & LeROY,
Hibbs Building,
Washington, D. C.

35 District of Columbia, *ss:*

Howard S. Le Roy, being duly sworn deposes and says that he is attorney for James E. Davidson, owner and operator of Station WBCM of Bay City, Michigan, the applicant herein, and conformably to the provisions of General Order No. 93, Subtitle B, Section 7, Paragraph (2), a copy of the above Appearance and Statement has been mailed to each of the interested parties as listed in the notice of hearing mailed by the Secretary of the Commission under date of March 25, 1931.

HOWARD S. Le ROY.

Subscribed and sworn to before me this 13th day of April, 1931.

[Seal of C. Ell Wills, Notary Public, District of Columbia.]

C. ELL WILLS,
Notary Public.

36 [Endorsed:] Federal Radio Commission. Application of James E. Davidson for Modification of License. File No. 2-M-B-521. Appearance and Statement. Le Fevre & Le Roy, Attorneys and Counsellors at Law, Hibbs Building, 725 Fifteenth Street, Washington, D. C.

37 Copy for Chief Examiner.

Friday, April 24, 1931.

Hearing Before the Federal Radio Commission,
Washington, D. C.

Docket No. 1152.

In re James E. Davidson. Call Letters: WBCM.

Hart, Dice & Carlson, Shorthand Reporters, 416 Fifth St. N. W., Suite 301-307 Columbian Bldg., Washington, D. C. Geo. L. Hart, Edwin Dice, Fred A. Carlson. Telephones: National 0343, National 0344.

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39 Federal Radio Commission, Washington, D. C.

Docket No. 1152.

In re Application of JAMES E. DAVIDSON, Bay City, Michigan. Call Letters: WBCM. Application for Modification of License. Frequency Requested: 940 Kilocycles; Power Requested: 500 Watts; Unlimited Time. Present Assignment: 1,410 Kilocycles; 500 Watts; Unlimited Time. Others Notified: WDAY, Fargo, North Dakota; WHA, Madison, Wisconsin; WFIW, Hopkinsville, Kentucky; WCSH, Portland, Maine; WWJ, Detroit, Michigan.

Room- 728-730, Federal Radio Commission, National Press Building, Washington, D. C.

Friday, April 24, 1931.

The above-entitled matter came on for hearing before the Federal Radio Commission at 2:15 o'clock p. m.

Present:

On behalf of the Commission: R. H. Hyde, Examiner; associate counsel: Ben S. Fisher.

40 On behalf of Station WDAY: (None).

On behalf of Station WHA: Paul M. Segal, Shoreham Bldg., Washington, D. C., and Horace L. Lohnes, Munsey Bldg., Washington, D. C.

On behalf of Station WFIW: George O. Sutton, National Press Bldg., Washington, D. C., and George R. Porter, Washington, D. C.

On behalf of Station WCSH: Paul M. Segal, Shoreham Bldg., Washington, D. C.

On behalf of Station WWJ: Frank D. Scott, Munsey Bldg., Washington, D. C.

Proceedings.

Examiner Hyde: There is one case remaining on the list that was set for hearing on the 23rd. Docket 1152, WBCM.

Mr. Le Roy: We are ready, Mr. Examiner.

Examiner Hyde: Respondents in this case are WDAY.

(No response.)

WHA.

Mr. Segal: WHA appears by Horace Lohnes and by myself, Paul Segal.

Examiner Hyde: WFIW.

Mr. Sutton: I represent that station with George R. Porter.

Examiner Hyde: WCSH.

Mr. Segal: I represent them.

41 Examiner Hyde: WWJ.

Mr. Scott: Representing WWJ.

Examiner Hyde: Since this case was set for the 23rd and these other cases remain to be heard this week, WLOE and the Taylor case are set for the 24th. I think it would be in order to take up the WBCM case now.

Mr. Le Roy, do you wish to make a statement?

Mr. Le Roy: I would just like to make a brief statement before putting on our witness. The issues on this application concern the question of whether the public interest, convenience and necessity will be best served by restoring to Station WBCM the original service area which it enjoyed when it went on this frequency.

WBCM started broadcasting on this frequency in December, 1928. At that time there were five or six stations on this frequency, but they suffered from restriction in their service area from that which might be expected from a 500-watt station on this frequency. They continued for about a year on that frequency. Then from that time on up to the present there are some six or seven additional stations that have got on that frequency, with the result that the present service area of WBCM has been pinched in to about approximately a tenth of what the original service area was.

The purpose of this application is to reestablish or to restore that service area. The most feasible way and the least objectionable way, it was thought, was to make application for this placing on the 940 kilocycle channel, which it was thought would cause no substantial interference to the other stations on that channel, and our testimony will be directed to those points. 42

Examiner Hyde: Before we go any further, I would just like to describe this application so that the record may be complete.

This is an application for a modification of license. The question is on the change in frequency assignment from 1410 kilocycles to 940 kilocycles, the power assignment to remain 500 watts and the time assignment to remain the same, that is, unlimited time.

Mr. Segal: May I make a motion?

Examiner Hyde: Yes, very well, Mr. Segal.

Mr. Segal: On behalf of Station WCSH, I desire to move that the application be dismissed for the failure of the applicant to allege in his appearance and statement that no interference will be caused with the service of WCSH by the operation of this station, it therefore appearing that the application is in conflict with the provisions of the General Order 40, whch provides that this frequency shall not be used in more than three zones unless no interference will result.

Examiner Hyde: The ruling on that motion will be reserved. Any other preliminaries before we proceed with the evidence in this case?

Let all the witnesses that expect to testify in this case stand up and be sworn at the same time.

(Three witnesses were duly sworn by Examiner Hyde.)

43 *Evidence on Behalf of the Applicant.*

Thereupon **Ralph Carpenter**, produced as a witness on behalf of the applicant, having been first duly sworn, was examined and testified as follows:

Direct examination.

By Mr. Le Roy:

Q. Mr. Carpenter, state your name and residence. A. Ralph Carpenter; residence, Bay City, Michigan.

Q. And what is your interest in the pending application? A. Since August 1928 I have been chief engineer of Station WBCM at Bay City, Michigan, owned and operated by James E. Davidson.

Q. And what are your qualifications as a radio engineer? A. I have been directly interested in radio engineering since 1920. I have held a Government commercial first-class operator's license since 1925. My technical education consists of four years' high school work and two years, 1926-1927, of electrical engineering work at the Bay City Junior College, accredited by the University of Michigan.

My experience in radio transmission has extended to ship stations, shore stations and broadcasting stations. I have been an associate member of the Institute of Radio Engineers since 1929. My broadcasting engineering experience has included the installation and maintenance of two broadcasting stations, WMPC at Lapeer, Michigan, and WBCM at Bay City, Michigan.

44 Q. Will you state the facts with respect to the present ownership and operation of Station WBCM? A. Mr. James E. Davidson in August, 1928, purchased Station WBCM, which had previously been owned and operated by the World's Star Knitting Company and known as Station WSKC. Immediately upon Mr. Davidson's taking control of the station, application was made to the Commission for a construction permit to erect and equip a new broadcasting station. This application was granted in the summer of 1928 and the new station went on the air December 8, 1928, operation meanwhile having been carried on with the equipment of the old station. The present station consists of a standard Western Electric D-88137 transmitter and associate apparatus located on Tuscola Road about one-half mile outside the city limits of Bay City. The main studios are located in the Wenonah Hotel, and are equipped with standard Western Electric studio equipment.

Q. Can you state what the approximate investment is in the present station? A. The investment in the present station involves an original expenditure of approximately $75,000 for actual tangible property, representing land, buildings, and equipment, exclusive of any value for station license or good will.

Q. What is the annual operating cost of the station? A. The gross operating costs of the station approximate $72,000 a year, exclusive of depreciation of equipment.

The average annual cost of maintenance is allocated to such items as salaries, $16,905.95; general expenses, $42,532.42; new equipment, $11,356.80; insurance, $242.02; freight, $60.75.

45 By Mr. Fisher:

Q. What is the total? A. Approximately $72,000.

Q. That was, as I understood, expenses of operation for a year? A. What year?

Q. What year was that, Mr. Carpenter? A. These expenses were for the year 1930.

By Mr. Le Roy:

Q. What is the operating personnel of the station? A. The operating personnel of the station includes eight persons on a full-time basis, including general manager, program director, two commercial men, three engineers and office manager. This is exclusive of part-time personnel in connection with sponsored programs. Since February, 1930, the station has operated sixteen hours a day six days a week, twelve hours on Sunday. The station has been affiliated with the Columbia Broadcasting Chain since January 1930, bringing Columbia Broadcasting program service to listeners in central and northern Michigan for the first time. This program service is not duplicated by other stations operating at this time.

Q. What is the present frequency allocation of Station WBCM? A. Since November 11, 1928, the station has been broadcasting on the 1410-kilocycle channel. At that time seven other stations were operating on the same channel without restricting in any way the service area. These stations on the same channel included:

46 WDEL, Wilmington, Delaware, 500 watts and unlimited time.

WHDI and WDGY, Minneapolis, Minnesota, 500 watts and sharing time.

KFLV, Rockford, Illinois.

WHBL, Sheboygan, Wisconsin, 500 watts, sharing time.

KGRS and WDAG, Amarillo, Texas, 1,000 watts and sharing time.

Q. You stated earlier, I believe, that the station started operation in December, 1928. Do you wish to correct that? You say here since November 11, 1928. A. Yes. The station operated with the old equipment from November 11, 1928 to December 8, 1928. As soon as the new installation was completed we began operating with the present transmitter, December 8, 1928.

Q. What was the original service area of this station? A. For approximately a year following the reallocation of November 11, 1928, the station's service area covered a large part of central and northern Michigan, including a population of over 666,000, distributed in the following counties as determined by large volume of mail and listening tests:

Tuscola County; three-fourths of Sanilac County; one-half of Lapeer County; one-third of Livingston County; one-half of Ingham County; one-half of Eaton County; one-half of Ionia County; Clinton County; Shiawassee County; Genesee County; three-fourths of Montcalm County; Gratiot County; Saginaw County; one-half of Mecosta County; Isabella County; Midland County;
47 Bay County; One-half of Osceola County; Clare County; Gladwin County; Arenac County; Missaukee County; Roscommon County; Ogemaw County; Iosco County; one-half of Crawford County; three-fourths of Oscoda County; and Alcona County.

Q. What has been the nature of the program service rendered by Station WBCM? A. The station has always served public interest, convenience and necessity by furnishing its listeners with the highest obtainable quality of broadcasting programs. This has averaged 105 hours a week, of which about 77 hours are Columbia chain programs and 28 hours of local programs, including a very liberal allowance of free time to educational, religious and philanthropic programs.

Q. I hand you these papers, Mr. Carpenter, and ask you to identify them as station programs. A. Yes, these are the regular station programs that are made by the station each week for the purpose of newspapers and people interested.

Q. What week was that? A. This is for the week beginning April 19th, this week.

Q. Do you know this to be true and accurate? A. Yes, I do.

Mr. Le Roy: I offer this in evidence as an exhibit.

By Mr. Fisher:

Q. These are typical programs; is that what you mean? A. Yes.

Q. Of an ordinary week of the station? A. Yes.

48 Q. Made under your direction? A. No, they are not.

Q. Made under Mr. Northcott's direction? A. Yes.

Q. You are familiar with the programs? A. Yes, I am.

Q. You know that that is about what the station operates on? A. Yes.

Mr. Fisher: No objection.
Mr. Segal: No objection.
Examiner Hyde: It may be made a part of the record.

(Two copies of program of WBCM for week beginning April 19, 1931, were received in evidence, marked "Docket 1152, Applicant's Exhibit No. 1," and are filed with transcript of record with the Commission.)

By Mr. Le Roy:

Q. What recent improvements in equipment and program have been made by the station? A. Relying upon the original service area of the station, in January 1930 the equipment was improved by the installation of all new studio equipment, and installation of Western Electric crystal oscillator, and a high percentage modulation panel, at a cost of approximately $12,000. At the same time the station affiliated with the Columbia Broadcasting Chain and increased its hours of operation to sixteen hours a day at a cost of approximately $35,000, including line charges and special programs. All equipment is Western
49 Electric and the most modern obtainable.

Q. What is the present service area of the station? A. At the present time the station serves an area which covers a territory immediately adjacent to Bay City in Bay County, serving a population of approximately 55,000. This involves a reduction in the population served of over 90 per cent.

Q. I hand you this map, Mr. Carpenter, and ask if you can identify it. A. Yes. This is a photostatic copy of a map I made which indicates the former service area of the station and also the present service area. The former service area is the portion included inside this line. The present service area is the shaded portion.

Q. Did you compile the data on which this map is based? A. Yes, I did. The data on the former service area was compiled very carefully by mail received by the station, and also by informal listening tests made by myself, and the present service area was determined by actual listening tests made by myself.

Q. What kind of equipment did you use on the tests? A. Western Electric equipment.

Q. Do you know this map to be accurately based upon the data which you assembled? A. Yes, I do.

Mr. Le Roy: I offer two copies of this.

Mr. Segal: May I have leave to cross-examine with reference to the exhibit?

Examiner Hyde: At this time?

50 Mr. Segal: Yes, Mr. Examiner.

Examiner Hyde: Any objection to that procedure, Mr. Le Roy?

Mr. Le Roy: No objections.

By Mr. Fisher:

Q. They are both on here, is that it, present and former? A. Yes, both on there.

Cross-examination on behalf of Stations WCSH and WHA.

By Mr. Segal:

Q. Mr. Carpenter, you have two service areas marked here? A. Yes.

Q. What is the nature of the limit in each case? How do you define it? A. The limit is defined as the place where programs can be received without objectionable interference.

Q. Are these interferences that you are complaining of heterodyne or cross-talk or both? A. Heterodyne interference exclusively.

Q. And for that purpose you just tested by a receiving set? A. Yes.

Q. Have you found that your present service is reduced to this very small shaded area of an average radius of nine miles? A. Yes, that is very——

Q. Beyond that you cannot hear satisfactorily on
51 a commercial receiver? That is the manner in which you define it? A. That is true.

Mr. Segal: No further cross examination.

Cross-examination on behalf of the Commission.

By Mr. Fisher:

Q. As I understand, your larger service area that you formerly claimed was established on this map, your Exhibit

12, by receiving of letters and fan mail, and so forth? A. Yes.

Q. Not by any actual tests from the station or any one from the station? A. Yes. As I said, by very close compilation of mail received and actual listening tests made by myself.

Q. The larger area? A. Yes, both.

Mr. Fisher: That is all now.

Examiner Hyde: Any objection to the admission of this exhibit?

Mr. Fisher: No objection.

Examiner Hyde: The exhibit may be made a part of the record.

(Two copies of present and former service area map of Station WBCM were received in evidence, marked "Docket No. 1152, Applicant's Exhibit No. 2," and are on file with transcript of record with the Commission.)

Mr. Porter: May I just ask this one question?

52 Examiner Hyde: Yes.

Cross-examination on behalf of Station WFIW.

By Mr. Porter:

Q. What kind of a set did you use when you made these tests? A. At the time the former service area was determined there were no commercial field intensity measuring sets on the market. The manner in determining the actual service area was by listening on a standard Western Electric 4-D receiver in determining where the signal strength was great enough above background interference so that satisfactory reception could be obtained at all times.

Q. When you refer to signal strength, then, you just refer to what you heard over a standard receiver? A. Over a Western Electric 4-D receiver.

Q. And how many of these tests did you make? A. As I say, they were informal listening tests and no actual record has been kept of them. I will say about a half a dozen.

Q. Half a dozen tests? A. Yes.

Q. You say no formal records have been kept of them? A. No, because at that time we did not suspect that anything like this would happen.

Q. How long a time elapsed between the time the tests were made and the time the chart was compiled? A. As I said, the listening tests which determined—which in part determined our former service area, what remained

53 during 1929 when we had no interference, no heterodyne interference on 1410——

Examiner Hyde: Mr. Porter, we permitted interruption of direct examination for cross examination on this one exhibit. It has been admitted, so I suggest that you go ahead with your direct examination.

Mr. Porter: I beg your pardon. I just got in. I was not aware just how far the case had proceeded.

Examiner Hyde: We will come back to the cross examination.

Mr. Porter: All right.

Redirect examination on behalf of the applicant.

By Mr. Le Roy:

Q. What is the reason for this sharp decline in service area, Mr. Carpenter? A. The reason for this decline in service area was due to the Federal Radio Commission's action in licensing the seven additional stations to 1410 kilocycles after WBCM had been operating on this frequency.

Mr. Fisher: We object to the question, and particularly the answer, as being an opinion of the witness as to what the reason was, and we certainly object to the answer that it is due to the Federal Radio Commission's licensing other stations upon this frequency. That is a matter to be determined. That is a conclusion and is an opinion; has nothing to do with actual facts. He can testify to facts that happened, but to say that that is the reason, we certainly object to that and ask that it be stricken.

54 Mr. Le Roy: I withdraw that question.

Examiner Hyde: The question is withdrawn.

By Mr. Le Roy:

Q. Will you name the additional stations that were allocated to this frequency? A. The stations licensed to 1410 kilocycles after WBCM had been operating on this frequency are WMAF, Dartmouth, Massachusetts, 500 watts and sharing time; WSSH, Boston, Massachusetts, 500 watts and sharing time; WLEX, Lexington, Massachusetts, 500 watts and sharing time; WRBX, Roanoke, Virginia, 250 watts and sharing time; WSFA, Montgomery, Alabama, 500 watts and sharing time; WODX, Mobile, Alabama, 500 watts and sharing time; and WHIS, Bluefield, West Virginia, 250 watts and sharing time.

Q. Has the station suffered any interference from nearby stations on adjacent frequencies? A. Yes. Between 4 o'clock and 6 o'clock in the afternoon the station suffers serious heterodyne interference from WMBC, Detroit, Michigan, operating on 1420 kilocycles. This interference has been noticed since an increase of power has been assigned to WMBC, an increase of from 100 to 250 watts, until local sunset, which was granted December 5, 1929.

Q. Has your station ever voiced any opposition to these additional facilities allocated on its frequency? A. The station has never had an opportunity to voice its opposition to these additional allocations of facilities on 1410 and an increase of power on 1420.

55 Q. Were you ever cited as a respondent in any hearings set? A. No. We received absolutely no notice of these assignments beforehand. In fact, the resulting interference has been so great that the Detroit Monitoring station of the supervisor of radio for the 8th District, some 90 miles away, has been unable to pick up the station's carrier for the purpose of measuring possible deviation, although the field intensity of the station's signals was greater than the average 500-watt station as determined by the Radio Division of the Department of Commerce. On this account a special broadcast was arranged by the station on March 21, 1931, from 1:15 to 2 a. m. for the purpose of checking the WBCM carrier frequency after other stations on the same channel had signed off. It was found that the station was deviating not more than 28½ cycles.

Q. What has been the effect of this loss of service area? A. Since December 1929 a large volume of mail has been received continuously from listeners in the original service area complaining as to interference and inability to receive the station programs during the late afternoon and evening

hours. The original service area, comprising central and northern Michigan, is not served consistently by any other station. The blanketing of the station's evening service prevents the programs from being heard in this part of the state. The large investment represented in the station is seriously threatened in view of the fact that the station's programs are not satisfactorily received in Saginaw, a city with a population of 85,000, some 11 miles away, from which the station derives the bulk of its income from the
56 sale of commercial time.

Q. Why did you make application for the 940 k.c. frequency?

Mr. Segal: May I interrupt to object, on the ground that that is immaterial?

Examiner Hyde: Objection is overruled.

A. The 940-kilocycle channel has seemed the most available channel under all the circumstances to permit the reestablishment of the original service area of the station without substantial interference to other existing stations on that channel. There is a greater separation between Bay City and the other existing stations on the 940-kilocycle channel than on any other regional channel.

Q. Now, Mr. Carpenter, I hand you two maps here; one showing the stations and the separations on 940 k.c. channel, and ask you to identify it. A. Yes; these maps were made by myself.

Q. You are satisfied as to their accuracy? A. Yes, I am.

Q. And the second map on the 1410? A. These were also made by myself.

Q. They are accurate, to your personal knowledge? A. To my personal knowledge they are accurate, yes.

Mr. Le Roy: I offer these in evidence.

Mr. Fisher. You say one is on the 1410 and the other on 940?

Mr. Le Roy: Yes. It shows the stations on this frequency.

Mr. Fisher: Existing stations?

57 Mr. Le Roy: Yes.

Mr. Fisher: No objection.

Mr. Segal: I desire to make an objection.

Mr. Fisher: It is a matter of Commission knowledge and record anyhow.

Mr. Segal: I desire to object to the particular introduction of these maps at this particular portion of the case because they are offered apparently for the purpose of showing that the average separation as testified to by this witness is less on 940 than it is on the other channel. The Commission has repeatedly held that the mere fact that a situation is bad on one frequency is no reason why it should be made bad on the others also, and therefore this is not probative of any issue which can be taken into consideration in determining the broad issue of public interest related to this application.

Mr. Le Roy: Mr. Examiner, that assumes that this change would make that situation worse on 940, which I believe is not established. I think it should be admitted.

Mr. Segal: Well, it has been established to this extent, that in designating the case for hearing the Commission has stated in its notice that the interference would probably be caused with other stations, and the burden of proving no interference rests upon the applicant. In the absence of any showing under that preliminary finding of the Commission and the requirement of General Order 40 that no interference would result, the presumption in this case is, of course, that interference will result.

Examiner Hyde: The objection is overruled.

58 (Two copies of map showing stations and separations on 940 kilocycles were received in evidence, marked "Docket No. 1152, Applicant's Exhibit No. 3," and are on file with transcript of record with the Commission.)

By Mr. Le Roy:

Q. Mr. Carpenter, have you made any surveys to show possible interference? A. Yes, I have.

Q. I hand you this paper, Mr. Carpenter, and ask you to identify it first on the 940 kc. frequency. A. Yes; this is a report of a survey I have made on 940 kilocycles, interference survey.

Q. When did you make that survey? A. This survey was made from April 6th to April 11, inclusive.

Q. And what kind of equipment was used in making the survey? A. It was known by a number of previous listening tests that had been made on the 940 kilocycle channel that no commercial field intensity measuring instruments could be used for this purpose, because the intensity of any signals that might be heard on 940 kilocycles in Michigan were of such a small, minute character, that they could not be measured below the sensitivity of present-day commercial field intensity measuring instruments. Therefore, we picked the most sensitive type of broadcast receiver, which is the Western Electric 4-D receiver, especially designed by myself so that the carrier waves of the station could 59 be detected. In fact, the Western Electric 4-D is a 6-tube superheterodyne receiver that is extremely sensitive and extremely selective, and it affords only head phone volume. This was used in making a record of this survey.

However, to make a relative comparison of carrier waves that might be heard with the Western Electric receiver, a standard 1931 Philco broadcast receiver was used in conjunction with the Western Electric receiver. The purpose was to determine the relative intensity of any signals that might be heard on the 940-kilocycle channel.

Q. Where were these tests made? A. These tests were made at 6 different points, 7 different points in all, including one daytime observation that was made for the purpose of determining whether or not WHA's carrier was heard in Michigan. This survey was made at 7 different points on the extremity of WBCM's former service area, a distance so that there would be a minimum distance between existing stations on 940 and the former service area of WBCM.

Q. Did you personally make these readings? A. Yes, I did.

Q. You are positive as to their accuracy? A. Yes, I am.

Mr. Le Roy: I offer these.

Mr. Fisher: No objection.

Examiner Hyde: If there are no objections the exhibit will be admitted.

(Two copies of survey on interference on 940 kilocycles were received in evidence, marked "Docket No. 60 1152, Applicant's Exhibit No. 4," and are on file with transcript of record with the Commission.)

By Mr. Le Roy:

Q. Mr. Carpenter, what did your survey of the 940 channel show? A. The survey that I made over a period of six nights, listening continuously from approximately 6 o'clock in the evening until midnight and making entries in this report -very 15 minutes, indicated that at one time during the six nights a carrier was heard on the Western Electric receiver as early as 7:30, and at one time during the six nights a carrier was heard as early as 7:45. However, during the other evenings tests were made and no carriers were heard until 8 o'clock.

Also this survey showed conclusively that WCSH's carrier was not audible at all in Michigan.

Q. Could you identify any of those carriers? A. Yes. During the major portion of the time between 8 o'clock and midnight when carriers were heard there were two carriers detected, and heterodyning with a different- of about 50 cycles, approximately 50 cycles. One carrier was identified as WFIW. The other carrier was identified once during the six nights as being WDAY, at Fargo, North Dakota.

However, all those observations were made on the Western Electric receiver, which I stated before is extremely sensitive.

Listening tests were also made simultaneously with the Philco broadcast receiver and showed that where WFIW's carrier wave was heard alone no program could be
61 detected on the Philco's broadcast receiver, which
shows a very minute intensity of WFIW's carrier.

During the majority of time when two carriers existed with a difference of about 50 cycles we attempted to pick up the 50-cycle heterodyne on the broadcast receiver, which, if it was of great enough intensity, would be audible, and this 50-cycle heterodyne was always below audibility on the Phil-o broadcast receiver.

So I think we were perfectly safe in concluding that none of the stations operating on 940 now can be heard in Michigan, under ordinary receiving conditions.

Mr. Carpenter, I hand you a paper on the 1410 kc. channel and ask that you identify it. A. This is a survey I made of interference on 1410 kilocycles, our present frequency. This was made simultaneously with the other survey.

Q. Was that made in the same manner? A. Yes, in the same manner.

Q. Made by you personally? A. Yes, by me.

Q. You are satisfied as to the accuracy of the reading? A. Yes, I am.

Q. Compilations? A. Yes, I am.

Mr. Le Roy: I offer this.

Mr. Fisher: That is on the 1410?

Mr. Le Roy: 1410.

Mr. Segal: No objection.

62 Mr. Fisher: No objection.

Examiner Hyde: Admitted.

(Two copies of survey of interference on 1410 kilocycles were received in evidence marked "Docket No. 1152, Applicant's Exhibit No. 5," and are on file with transcript of record with the Commission.)

By Mr. Le Roy:

Q. What does your survey show on the 1410 channel, Mr. Carpenter? A. Survey on 1410 shows that as early as 4 o'clock, approximately 4 o'clock in the afternoon, we are interfered with seriously. The interference between approximately 4 o'clock and approximately 6 o'clock in the afternoon is caused by Station WMBC at Detroit. The period of time from 6 o'clock until midnight, of course, the interference is so complex that I was unable to determine any of the stations causing interference; but from approximately 6 o'clock until midnight the heterodyne interference is so terrific that our programs are not audible at all.

Q. At what points was this survey made? A. This survey was made at the identical points that the survey for the 940 kilocycles was made, at the extremity of our former service area.

By Mr. Fisher:

Q. You mean 85 miles out in all directions? A. Yes.

By Mr. Le Roy:

Q. Has your station, Mr. Carpenter, ever been cited for violation of Commission regulations? A. No, it has

63 not.

Q. In your opinion, Mr. Carpenter, as a radio engineer, would this shift in frequency restore to you your former service area? A. Yes, I am sure it would.

Mr. Le Roy: That is all.

Examiner Hyde: WDAY, I believe, was not represented. WHA now?

Mr. Segal: No questions.

Examiner Hyde: Counsel for WFIW may cross-examine the witness.

Cross-examination on behalf of Station WFIW.

By Mr. Sutton:

Q. Mr. Carpenter, this Western Electric 4-D receiver that you used. A. Yes.

Q. Is there any way of determining the strength of the received carrier except by audibility? A. No, there is not. As I stated before, it was absolutely necessary to depend upon oral observations because of the very small intensity of the carrier waves that were detected.

Q. I see. A. Present-day field intensity measuring equipment is capable of measuring a carrier wave that has an intensity greater than one milliwatt per meter?

By Mr. Segal:

64 Q. One what? A. Pardon me. One millivolt per meter. My error.

By Mr. Sutton:

Q. You could not obtain equipment that would measure field intensities under that value? A. There is none available at the present time.

Q. None available? A. No, there is not.

Q. How many places did you try to obtain those? A. I am in very close contact with the engineering field, with all the new equipment produced by both the General Electric and Westinghouse and Western Electric. I know that none of the companies mentioned have that equipment available.

Q. Did you try the General Radio Company? A. I know the General Radio Company do not have that equipment available either.

Q. If I would tell you that there were three witnesses on the stand yesterday who swore that they used field strength measuring equipment that would measure below one millivolt per meter, would you be surprised that it was General Radio equipment? A. Yes, I would.

Q. You don't feel like it would be possible to measure field strength measurements below one millivolt with General Radio equipment? A. I don't know of any equipment that the General Radio Company has with which it would be possible to do that.

Q. You did not take it up with them to try to find
65 out? A. I didn't no.

Q. Now, you say you listened to these carriers and depended on audible means of determining whether they were present or not? A. Yes.

Q. Do you think the human ear is a very sensitive piece of apparatus for determining field strength measurements? A. As I say, the intensity field of a thousand watt station for a distance greater than 500 miles is so minute that it cannot be measured.

Q. What would you estimate it to be under ordinary conditions? A. I wouldn't even make an estimation, because it was barely audible with the 6-tube superheterodyne receiver using ear phones for reception.

Q. Now, using this 6-tube receiver, what kind of a pick-up did you use? A. A 100-foot aerial.

Q. A 100-foot aerial? A. Yes.

Q. Was this equipment shielded to protect its pick-up against stray frequencies? A. It is entirely shielded.

Q. Was it calibrated in any way to determine the strength of the field that you measured? A. It was not.

Q. Then if there was a field there present of one millivolt
how would you have determined if it had been one
66 millivolt instead of 50 microvolts? A. There is no
possible way of determining. However——

Q. Just a minute now. Would you have had any way of knowing what the strength of that carrier was? A. No.

Q. Then it might have been one millivolt? A. No.

Q. It might not have? A. It was not.

Q. What means did you have of determining that? A. Because the field strength of one millivolt per meter is supposed to be the minimum field intensity necessary for good radio reception in rural locations, and at all times doing these surveys that I made the audibility was below the audibility of an ordinary broadcast receiver and was barely, barely discernible with the Western Electric receiver with head phones.

Q. You say that was supposed to be. You would have no knowledge of whether it was on these particular dates, would you? A. We know by comparison that it was not.

Q. And what comparison did you make? A. Because the signal strength was not at all audible on ordinary broadcast tests.

Q. And feel that that would be an indication that the field strength might be less than one millivolt? A. Yes, very much so.

67 Q. Now, if you have two carriers present, let us say one, to make it simple, 10 microvolts, another one present of 10 microvolts. How do they ordinarily add together and affect the audibility in the receiver? A. If there are two carriers present of approximately the same strength, if there is a difference between the carriers it is usually impossible to receive either program effectively.

Q. I am not speaking about the effect, but having two present how will they add together? Will they just add simply arithmetically, or will they add—— A. It would be the sum and the difference.

Q. Sum and the difference? A. Of the two carriers then, yes.

Q. If you had two carriers of 10 microvolts each present, the effect would be 20 microvolts on the receiving set? A. Possibly, yes.

Q. Possibly—what other possibility would you have? A. At the same time the other difference would be cancelled if the two carriers were of the same intensity.

Q. Now, at how many places did you make these tests? A. At seven different places, six different places in the evening and one observation made during the day for the purpose of listening for daytime stations operating on 940 kilocycles.

Q. Did you use the same installation in each one of these places? A. Yes, we did.

68 Q. Did you use the same antenna? A. We used the same length antenna. Of course, local conditions determined the height that we obtained for the antenna system.

Q. So in some cases you did not have the same height antenna? A. Each place that we took or each place that we decided to make an observation, if you will notice, is a small town. We picked those small towns principally because the background interference would be less than in a larger area, and also we spent all the way from a half hour to an hour in each town before we determined where to make the observations for the evening. We picked out the best available spot to make the observations.

Q. What I am getting at is this: Your pick-up was different in different points; is that correct? A. The reception was very good in all places.

Q. I am speaking of the times you had to change your antenna for the pick-up of the receiver. We used the same antenna system at each place. The height varied slightly.

Q. Varied slightly? A. Yes.

Mr. Sutton: That is all.

Examiner Hyde: Any questions on behalf of WCSH?

Mr. Segal: Yes, please.

69 Cross-examination on behalf of Stations WCSH and WHA (continued).

By Mr. Segal:

Q. Do you know the permissible frequency deviation under the Commission's General Orders? A. Yes, I do.

Q. How much is it? A. 500 cycles.

Q. If you operated on 940 there would be a permissible total deviation between yourself and the existing stations of a thousand cycles, won't there? A. Yes.

Q. In the course of your experience have you ever come to any conclusion about what is the smallest ratio of desired carrier to interfering carrier that will permit satisfactory reception? A. The ratio is very high.

Q. About what is the smallest satisfactory ratio? A. About 100 to 1, I would estimate.

Q. You say that at points 85 miles from your station WFIW and WDAY, and probably some others whom you could not identify, were laying down signals of less than one millivolt per meter? A. Yes.

Q. Can you help us by estimating how much less? A. There is no possible way of estimating such a small intensity. As I said, on an ordinary broadcasting receiver——

Q. Yes, I have heard that. I just thought—you
70 cannot estimate it? A. No; there was no possible
way to estimate it.

Q. It was strong enough for you to hear the call letters of WFIW? A. Yes; several times during the six nights I identified the call letters of WFIW. Once during the six nights I identified WDAY.

Q. You identified WFIW practically every night, didn't you? A. I identified the station at occasional points, and of course they faded below audibility, even on the Western Electric receiver. However, I could still hear the carrier wave, and because of the heterodyne set-up between the carrier wave and the receiver I could determine that it was the same carrier wave that I had heard previously.

Q. In other words, you hear that from time to time during this week? A. Yes.

Q. Not only the carrier but the modulated signals? A. Yes.

Q. Do you happen to know what the threshold of the 4-D Western Electric is in terms of microvolts per meter? A. No, I do not.

Q. Would you say that it is as high as 50 microvolts? A. I have no way of estimating. I know it is about the most selective broadcast receiver obtainable.

Q. I know, I am not talking about the selectivity. I mean
sensitive. A. It is about the most sensitive broadcast
71 receiver obtainable also.

Q. Have you any idea whatever of the signal you use to lay down 85 miles away from your present transmitter in its present location in terms of micro or millivolts per meter? A. As I say, at the time I made the observations, there was no field intensity equipment available at that time.

Q. You mean in 1928? A. In 1929.

Q. When did they start making the equipment? A. About six or eight months ago it was available on the market, from the Western Electric Company.

Q. You don't know what you were doing 85 miles away? A. We know from listening tests that we were putting in a very good signal 85 miles away, and we also know that a very large volume of mail from the people within that radius shows that they are enjoying our programs both day and night without interference.

Q. And then the Commission began to put other stations on your frequency? A. Yes, it did.

Q. And they put on stations at Boston, I think you testified? A. Yes.

Q. And that caused interference to you? A. We don't know definitely about the Boston stations. We know definitely about the other stations.

72 Q. What did you do about it, take an appeal? A. As I said, these stations were added to 1410 kilocycles without giving the station any chance to oppose them beforehand.

Q. Well, when you found out about it did you go to court over it? A. This interference has been extremely noticeable since February, or since the beginning of 1930, and we have been very well aware of the fact, and since February 1930 this present application has been in.

Q. I am talking about clearing up your own frequency. Have you done anything about that at all, filed any applications? A. Yes, we have.

Q. Such as General Order 15? A. We filed an application for 920 kilocycles.

Q. Just a moment; I am talking about your own frequency. Have you tried to remedy that situation on your own frequency by getting the court to decide it before this thing started? A. No, we have not.

Q. Have you ever seen General Order 15? Have you ever seen any General Order of the Commission that provides the procedure when you get unusual interference on your frequency? A. I have seen all the General Orders.

Q. Have you ever done anything about that? A. As I said, we felt that the only possible way to eliminate this interference would be to apply for another frequency, because there were so many stations operating at that time on 1410 kilocycles. 73

Q. Well, I still don't think—I know that you are trying to help yourself by changing frequencies, but I am just wondering what you have ever done to help yourself on the frequency that you had ahead of these other fellows who were put on. A. I don't know as there is anything we can do.

Q. You never heard of anything you can do about that. Now, you testified that your station lays down a greater than average field strength at a distance for a 500-watt station, did you? A. Yes.

Q. What gives you that opinion? A. By measurements the Radio Division of the Department of Commerce made at the station last fall.

Q. Is there anything special about your station that should give it greater signal strength at a remote distance than the average station, anything special about yours? A. I am talking about the signal strength within our service area.

Q. Well, how? You say that extends to 85 miles? A. Yes. We have an extremely efficient location.

Q. What is there about your location that is so efficient? A. From a radio engineering standpoint it is the best type of location possible to obtain.

Q. What is the character of the ground? Are you in a
moist area there? A. Yes, the station is located in
74 the country. There are no objects within a half mile
radius to absorb any of the energy. The ground is
very moist, affording a very good low resistance ground
system for our transmitter.

Q. That whole Great Lakes area there is very good from the standpoint of propagation, isn't it? A. Yes, it is.

Q. And how far did you actually get mail when your channel was a little more clear? A. During 1929 we covered most of Michigan very good.

Q. Well, you would get mail occasionally from more distant points, wouldn't you? A. Oh, yes.

Q. How far away have you gotten it? A. Oh, we have received mail from all parts of the country, different parts of the world.

Q. Was that with your present transmitter? A. Yes, it was.

Q. In your present location? A. Yes.

Q. You have been heard, you say, all over the world? A. I said in various parts of the world.

Q. Been heard all over the United States? A. Yes, we have, under ideal receiving conditions, of course.

Q. By "ideal receiving conditions" you mean those good nights in the winter when it usually gets out so far? A. Yes.

Q. And on good winter nights when you had no excess
heterodyne you used to be heard all over the coun-
75 try on and off? A. Not consistently at all. Under
exceptional conditions we have been heard at a great
distance, like any other station.

Q. Well, I think you testified that you did better than the average? A. I said that our local field intensity was greater than the average 500-watt station.

Q. And you have a particularly good location for that? A. Yes.

Q. Now, prior to 1929 you say you had a station on your frequency at Minneapolis? A. Yes, we did.

Q. How far away from you is that? A. I have not measured the distance.

Q. Well, is it still on your frequency? A. No, it is not.

Q. Would you say it is about 300 miles? A. I imagine that would be approximately correct.

Q. And that has been taken off? A. Yes.

Q. You say you had one on your frequency at Rockford, Illinois? A. Yes.

Q. You had that before all these additions you have complained of? A. Yes, we did.

Q. And that is only 260 miles away? A. Yes.

76 Q. So that as long as there has been a WBCM there has always been one station 260 miles away? A. Yes, there has.

Q. 500 watts? A. Yes.

Q. Right across the Lake? A. Yes.

Q. How long has Sheboygan been on your frequency? A. Sheboygan has been on 1410 since the reallocation November 11, 1928.

Q. Now then, as long as there has been a WBCM there was a station at Sheboygan 180 miles away on your frequency? A. That is true.

Q. And that is right across the Lake? A. Yes.

Q. And right across this whole good transmission area? A. Yes.

Q. Now, getting back to these tests of yours, you made these this spring; you haven't any winter tests here, have you? A. No, I have not.

Q. And you only have them for one week or for less than a week? A. For six days.

Q. Six days. And on the first of those six days beginning at 8 o'clock in the evening you heard WFIW's carrier and detected one of its programs and that continued all through the evening; is that right? A. Yes, and at the same time it was inaudible on an ordinary broadcast receiver. 77

Q. Yes, I know, but the carriers are inaudible on receivers. A. No, the program was inaudible.

Q. What sort of a local oscillator did you use to beat against that carrier? A. The second detector in the superheterodyne.

Q. What did you do with your oscillator, just turn that up so as to throw it into—how did you get that to beat against the carrier? A. Yes, I made the second detector generative and had it variable so that I could make it oscillative if I wished and keep it below the point of oscillation if I wished.

Q. And how did you do that, by rewiring the set? A. Very slightly, yes.

Q. Now, along about 9:15 you got an additional carrier? A. Yes.

Q. At Sanilac, Michigan. You were not able to identify it down to the 50 cycles away from WFIW? A. Yes.

Q. And that continued on all through the rest of the tests up until midnight? A. Yes.

Q. You had two carriers that night? Now, let me ask you: You have testified that you had quite a bit of experience in long and short wave telegraphy. Have you had experience with continuous wave telegraphy? A. Yes, I have.

78 Q. Using a vacuum tube receiver? A. Yes.

Q. Using a heterodyne receiver? A. Yes.

Q. In that you set up a local oscillation, don't you? A. Yes.

Q. And you get a very faint signal at a great distance, don't you? You have in the course of your work on shipboard? A. Yes; in exceptional cases you receive great distances.

Q. And by turning up your local oscillator you can make that audible, can't you? A. Yes.

Q. And the more you turn up your local oscillator the louder the signal comes once you have gotten it? Is that right? A. Yes.

Q. What is the ratio? How do they vary each against the other? A. The intensity of the beat note is practically constant. That is, the intensity is practically constant regardless of the strength of the local oscillator.

Q. Isn't it true that where you are getting a beat note the intensity of the beat note varies proportionally to the

sum of the carrier and the local oscillation; or does it vary according to their product? Which is it? A. Well, there
might be some confusion there, because a variation
79 in the heterodyne causes a variation in the—the
human ear does not respond to all frequencies the same, and varying the heterodyne beat note might tune the heterodyne to a frequency which is more easily audible by the human ear than another.

Q. Well now, I am speaking about a heterodyne that is not of a constant frequency. A. I see.

Q. And an increased volume in the local oscillator. Isn't it true that the volume of the heterodyne varies according to the product of the two, the incoming signal and your local oscillator? A. No, I don't think so.

Q. You don't think so? A. No.

Q. Do you think it requires a very great heterodyne 85 miles from your station, a very great, very strong carrier, to limit your service area? A. Yes, I do.

Q. How strong a carrier do you think you would need 85 miles away from your station to block off its service at that point? A. Comparatively speaking, it would be possible one part in a hundred. That is, the intensity of the two would vary by that ratio.

Q. Well, suppose WFIW or WCSH was laying down 20 microvolts there. You would have to lay down 2000 to serve that territory, wouldn't you? A. Yes, but WFIW and WCSH would not lay that down.

80 Q. You never measured it? A. No.

Q. Then you are not able to tell us that it is considerably less than a thousand microvolts; isn't that right? A. Yes, very considerably less.

Q. How much less you cannot tell us and you have no figures? A. Yes. There is no way of measuring it.

Q. Yes. That is, that you have heard of. There are lots of ways. But so far as you know, it is something considerably less than a thousand microvolts? A. Yes, but as I said, at the present time our signal is not heard at a radius outside of 9 miles.

Q. Well, but you still go on whether you lay or not. The waves go playing on, don't they? A. Yes, that is true, but it happens that the heterodyne interference is evidently greater than our carrier.

Q. Have you ever consistently laid down any 2000 microvolts at a distance of 85 miles away? A. No, we have not.

Q. Now, if it were a 50-millivolt signal from some of these stations there, you would have to lay down 5000, wouldn't you? A. That is true.

Q. Now, you heard WFIW practically every night, didn't you, in these tests? A. We got, identified, WFIW every night, yes.

Q. At least at some time during this period you heard the modulation, program? A. On the Western Electric receiver.

81 Q. And practically all evening you heard at least two carriers on that 4-D? A. Yes, that is right.

Q. And you have no data as to what its threshold is? A. What do you mean by "threshold"?

Q. The lowest point in signal strength at which it will receive and detect and deliver a usable signal. A. No.

Q. You don't know? A. But, as I pointed out, the audibility of both the heterodyne and the program of these stations were heard on 940 always below audibility on the 1931 broadcast receiver.

Q. Well, that is a Philco that does not have any oscillator on it? A. No, it has not.

Q. The only way that you can tell whether or not there is a free carrier, unmodulated, is with an oscillator, isn't it? A. That is the idea; but at the same time, as I said, there was no way of telling the value of the carriers that we might hear with the 4-D receiver.

Q. That is right. A. And that was the reason for using the Philco receiver in conjunction with the Western Electric receiver.

Q. If you had a carrier that was a hundred millivolts per meter and it had no modulation on it you could not hear it on that Philco, could you? A. Yes, but every broadcasting station's carrier is modulated.

82 Q. You are familiar, are you not, with the fact that the carrier goes far beyond the modulated signal? A. Yes.

Q. By a very, very large ratio? A. Yes, sir; that is true.

Mr. Segal: I think that is all the cross examination.

Examiner Hyde: Counsel for WWJ may cross-examine the witness.

Cross-examination on behalf of Station WWJ.

By Mr. Scott:

Q. Do I understand your primary purpose is to get back to the point where you are rendering service comparable to that that you were rendering in 1928 and 1929? A. Yes, that is it.

Q. How long have you been a radio engineer? A. I have had a government license, first-class operator's license, since 1925, and I have been actively interested in radio since 1920.

Q. How long have you been engaged in practical radio work? A. Almost continuously since 1926.

Q. How long have you been connected with this station? A. Ever since it was installed, the summer of 1928.

Q. Based on your practical experience as a radio engineer, what would you say as to whether or not your original service area would be returned to you providing the stations that you have enumerated as having been put on the frequency after your occupancy were removed? A. I believe our original service area would be returned to us. 83

Q. Now, this map that you have drawn here which is identified as Exhibit 2 shows to the north the town of Lincoln, off over in the middle of the state Grayling, off in the middle of the state to the west side Reed City, Grand Rapids, Mason, Holly and Sanilac. A. Yes.

Q. I came in just as you were offering this exhibit. What does that outer line represent, the normal service area? A. That represents our former service area, yes, before January 1930.

Q. Before January 1930? A. Yes.

Q. January the 1st, 1930? A. Approximately since the first of the year 1930.

Q. You mean 1930 and not 1931, do you? A. Yes, 1930.

Q. Now, when did you make this map? A. That map was made just a few days ago.

Q. Yes, and it was based on information, represented information that was acquired prior to January 1930? A. Yes. That is, the line indicating the former service area was. The line indicating the present service area, of course, was determined recently.

Q. During the year 1929 or any time prior to the 1st of January, 1930, did you go out over this area represented in the enclosure of the line on your map Exhibit 2, to make any field strength tests to determine what signal
84 you were laying down? A. No field strength tests were made, but listening tests were made to observe how the station was received in these various areas, and we are perfectly confident that we put down a very good signal in all portions indicated as our former service area.

Q. Well, to what extent is this Exhibit 2 based on fan mail? A. To what extent? I would say that the original service area was based about 50 per cent upon mail received and about 50 per cent upon observations that we had made.

Q. Then you actually did, prior to January the 1st, 1930, make observations up at Lincoln and over at Grayling? A. No, not at those particular points.

Q. Over at Reed City? A. No, those particular points there designate the places I made these last observations for interference on 940 kilocycle.

Q. Have you made any observations to determine whether your service is directional? A. No, we have not.

Q. Do you know whether—well, this may be—I will ask a question if I may: Have you ever made any investigation or does your fan mail disclose that your service to the north is better than it is to the south? A. Yes, it does.

Q. I notice that you stop at Lincoln? A. Yes.

Q. Don't you get any mail from Harrisville? A.
85 Oh, yes. That is a very conservative estimate of our former service area. We were heard in all parts of northern Michigan, of course.

Q. Prior to the 1st of January, 1930? A. Yes, of course.

Q. Well, do you know what parts of northern Michigan you were heard in up to January the 1st, 1931, consistently. A. You mean between January 1930 and January 1931?

Q. Yes. A. Of course, the interference that we have now has not developed over night. It has developed gradually. And we have been fully aware of the fact that the interference exists for over a year, and we began noticing serious interference about the first of 1930, and since that time it has become increasingly worse all the time, until at the present time the service area, as is indicated there, has a radius of about nine miles.

Q. That is the consistent service area of the station? A. That is the consistent nighttime service area of the station, yes. That is the extreme service area.

Q. Let us confine it to nighttime. Then during the year 1930 or in the appreciable part of the year 1930 up to the first of January 1931, your previous service area to the north of you—I am now leading up towards Oscoda and Lincoln and Otsego and Alpena, going up in that territory you say that your service in that portion of the state of Michigan has diminished during the year 1930? A. Yes, it has.

Q. I would like to have you tell me upon what you
86 base that assertion. A. Upon actual listening tests.

Q. You made yourself? A. Yes.

Q. Where did you listen? A. Upon actual listening tests and upon a great deal of mail that we have received to that effect.

Q. Did you receive any mail from up in that territory around Christmas time, during the Christmas week, from the 25th of December up until the 2nd day of January, 1931, indicating that you were not being consistently received? A. I don't know whether we received mail from that particular portion of the country at that particular time or not. I could not tell you.

Q. Do I understand you to say that by comparison of aggravation your service to the south has been injured more than your service to the north? A. No.

Q. Is that correct or isn't it? A. No; I would say it was injured in each direction approximately the same.

Q. Now I understood you to say that you had in large measure been able to identify the stations which were causing this interference? A. Yes.

Q. Where are those stations located? A. Two stations in Alabama we know are causing serious heterodyne interference to us. They are WODX at Mobile and WSFA at Montgomery.

87 Q. Yes. A. We also know that WRBX in Virginia is causing us serious trouble.

Q. Relatively, in what direction are those stations as to the station in Bay City? A. To the south and southeast.

Q. Now, there cannot be any question about that, can there? A. No, not at all.

Q. And yet you say that the interference that you receive from those stations causes an equal amount of injury to your signal to the north of Bay City that it does to your signal to the south of it? A. Approximately, yes.

Q. Now just one more question, if you will indulge me. How far are you from Detroit, air? A. We are about 90 miles air line from Detroit.

Q. Based on your engineering experience, do I understand you to say that you do not expect to cause any interference with WWJ operating on 920? A. Yes.

Q. Why do you think you won't? A. Because from actual experience we know that WWJ has a very low field strength north of Detroit, particularly in Flint, Saginaw and Bay City.

Q. But if you are correct in your thought that the transfer of your station from your present assignment, 1410, to 940 will return to you approximately the service area that
you enjoyed before, you will then on the 940 channel
88 be serving an area with a diameter of approximately
165 or 175 miles, 85 miles to the south? A. Yes. Of course, we do not consider the Canadian territory in which our signal is heard a part of the service area.

Q. Well, is my arithmetic wrong, then, in the thought that if you serve 85 miles to the south you will be within five miles of Detroit, providing your statement is correct—and I approve of it—that Detroit is 90 miles away? A. If you will notice according to this map it is designated that the radius is an average of 85 miles, and actually to the south it is considerably less, because, as you will notice, the intensity of our station to the south seems to be less than it is in other portions.

Q. Well, let us take this, then: What would you say would represent your minimum reasonable service area to the south of Bay City, providing your present application was standard? I won't take your maximum; I will take your minimum. What in your judgment, based on your experience as an engineer, would represent your minimum consistent service area to the south of Bay City? A. Approximately 50 miles.

Q. All right, then; if my arithmetic is correct that would bring you 40 miles from the city of Detroit laying down an acceptable signal at all times? A. Yes.

Q. And you are of the opinion that that service 40 miles from Detroit would not occasion any interference with the signal reception of the signal from WWJ on the

89 920 channel? A. I believe so, because there is a separation of 20 kilocycles between the two frequencies.

Q. Yes. Based on your engineering experience, what would you say was the minimum essential separation between two stations operating simultaneously, one on a power of 500 and the other on a power of 1000 watts, with 20 kilocycles separation? A. That, of course, depends upon the field strength of the individual stations.

Q. Well, would you care to venture a general rule which might be more or less uniformly applicable? I am now speaking of nighttime operation. A. Yes.

Q. And will you give it to me in the daytime too, so we will have both of them? A. In this particular case we are referring specifically to WWJ in Detroit and WBCM in Bay City?

Q. Right. A. Well, as it assumes the transmitter of WWJ is located in the heart of the business section of Detroit and it is surrounded entirely by business buildings which exceed the height of the radiation system of WWJ considerably——

Q. Except to the south. A. Except to the south, yes; and that fact alone, the fact that the absorption is so great on WWJ's signal in Detroit, would cut down measurably the intensity of WWJ's signal outside of Detroit.

Therefore, in this particular case I do not believe there would be any interference between Bay City and

90 WWJ, because WWJ's field intensity to the north of Detroit is exceedingly small.

Q. Well, that is interesting if true, but I am wondering upon what you base that opinion. Have you ever made any field strength tests of the WWJ signal outside of Detroit? A. No, I have not. That is based principally——

Q. That is all. You say you have not made it? A. I never have. That is based principally upon listening to WWJ a great many times; that is, trying to listen to WWJ.

Q. At Bay City? A. At Bay City, Saginaw and Flint. Reception of WWJ does not come in strong enough at any of those three places to overcome the ordinary background noise noticeable in those towns and cities.

Q. How long have you listened to WWJ and Flint? A. During a period of, oh, approximately two years.

Q. Every day? A. Not continuously, no.

Q. During the last two years? A. During the last two years, yes.

Q. Both day and night? A. Oh, no. Very seldom, as a matter of fact.

Q. Well, I mean—— A. Oh, you mean—yes; I have listened to WWJ at night and also in the daytime.

Q. Approximately how many times? A. Oh, possibly during the last two years a hundred to a hundred and fifty times.

91 Q. At Flint? A. No; at Saginaw, Bay City and Flint.

Q. Well, Saginaw is only 15 miles from Bay City? A. Yes.

Q. And Flint is 35 or 40 miles south of Saginaw? A. Bay City is about 30 miles south of Saginaw.

Q. You mean Flint is 30 miles south of Saginaw? A. Pardon me, yes.

Q. I know what you meant. A. Yes.

Q. How many times, approximately, have you listened in Flint in an effort to get the WWJ program? A. Not more than 10 or 15 times in Flint. The majority of the times I have listened to WWJ have been in Saginaw.

Q. Not to heckle you, but I am anxious if I can, if you care to venture an opinion as to the requisite separation between two stations operating simultaneously with a kilocycle separation of 20 kilocycles, with a power of 500 watts on one hand and 1000 watts on the other, both day and night. Do I understand you to say that you do not care to venture an opinion as to a general rule which might be generally applicable, except in some occasional cases where there was a pronounced differential in what might be termed the usual and customary operating conditions? A. Yes. Of course, ordinarily the Commission designates a distance of 147 miles as being necessary between two stations operating a distance of 20 kilocycles, and with the power of 1,000 and 500 watts; but my own personal opinion is because of the comparatively small intensity of

92 WWJ's signal north of Detroit there would be no interference caused in this particular case.

Q. Well, not admitting, either directly or indirectly, the correctness of your assumption or your assertion as to the signal strength of WWJ at the present time, but assuming for the sake of the discussion here that it is as you suggest; supposing that they moved their transmitter from its present location for the purpose of increasing the signal strength and thus enlarging their service area: Then what would you say as to the probability of interference with your station on a 20-kilocycle separation? A. Isn't that basing an assumption upon an assumption?

Q. Yes, it is. If what you say is true, if WWJ is not rendering a consistent service in an appreciable area around Detroit, it is not highly improbable that they might, as soon as they make that discovery—— A. WWJ is rendering a very good service in Detroit. They are rendering very poor service north of Detroit.

Q. Would you change your mind if they moved their station outside the city limits? A. It would depend, of course, which side of the city they moved their transmitter to.

Q. They could not move it on the east side? A. No.

Q. So that if they moved it to the north or to the west—— A. It is very improbable that they would move their transmitter to the north of Detroit, though, because of the engineering experience that they have had with Station
93 WGHP in the past.
WGHP had their transmitter located at Mt. Clemens, slightly north and east of Detroit, with a power of 750 watts, which is, of course, very close to a thousand watts, and they found that the station operating at Mt. Clemens, slightly north of Detroit, did not cover Detroit at all, and in the case of WGHP they moved their transmitter down back in the business section of Detroit.

And at the same time WJR, I understand, has the same difficulty. WJR has its transmitter at Pontiac and operates at 5000 watts power, but actually WWJ serves Detroit. And also WXYZ served Detroit slightly better than WJR does.

Q. Have you listened to WGHP since they moved their transmitter down on Woodward Avenue? A. Yes, I have.

Q. What is your reaction now as to that station? A. WGHP, which is known as WXYZ now, renders a greater service to Detroit now than they did when they were located at Mt. Clemens.

Q. I am speaking of the service outside of Detroit. A. WGHP and WXYZ have approximately the same intensity outside of Detroit.

Q. Well, WGHP and WXYZ are the same? A. They operate on the same powers.

Q. Compare that with WWJ. How does their service compare outside of Detroit in the rural area? A. I would say that WXYZ, formerly WGHP, served the territory outside of Detroit slightly better than WWJ does.

Mr. Segel: That is all.

Examiner Hyde: Commission counsel, any questions?

94 Mr. Fisher: I think most everything has been covered. I will try to be very brief. There are a few points that I want to bring out to see if I understood them properly.

Cross-examination on behalf of the Commission.

By Mr. Fisher:

Q. Do I understand that your present transmitter at your station now is located eleven miles outside of Bay City? A. No.

Q. What was the 11 miles? A. Saginaw is located 11 miles from Bay City.

Q. Where is the transmitter located? A. The transmitter is located on the Tuscola Road about one-half mile outside the city limits of Bay City.

Q. How far is that from the center of Bay City, approximately? A. That is approximately three miles.

Q. Now, as I understand, based upon the same kind of measurements, which were by receiving sets and not any field strength tests at all—— A. Yes.

Q. —you discovered your former service area to be around 85 miles average? A. Yes.

Q. With a little less to the south towards Detroit? A. Yes.

Q. But according to your map 85 miles to the west? A. Yes.

95 Q. And since January 1930, upon tests made on receiving sets, it is now reduced to 9 miles; is that correct. A. At the present time it is approximately 9 miles.

Q. At the present time. A. Yes.

Q. And those are practically the same kind of tests made? A. Yes, they were.

Q. And I understand that during both of those tests station WHBL and KFLV were on the air with you at the same time? A. That is true.

Q. On the same frequency. A. Yes.

Q. And you say to the west you have a service area of approximately 85 miles? A. Yes, that is true.

Q. And WHBL is a Sheboygan, Wisconsin? A. Yes.

Q. Which you state is 180 miles? A. Yes.

Q. And you did not get any heterodyne interference 85 miles out? A. That is very unusual and it looks like a little impossible on the face of it.

Q. Isn't it impossible, as a matter of fact? A. Pardon?

Q. Isn't it impossible, as a matter of fact? A. Well, no, it was not, because from actual facts and actual surveys
and mail from listeners in that portion of the coun-
96 try, it showed that they enjoyed our programs with-
out interference in 1929.

Q. Well, of course now, you understand this, those two stations divide time, don't they? A. Yes, that is true.

Q. It is barely possible that listeners would get your station when Sheboygan was off the air, isn't that correct, at night, and that would be the kind of mail that you would get from that direction? That is possible, isn't it? A. That is possible, yes.

Q. They were not on the air at all at night? A. It is possible but improba-le.

Q. Well, you know that they divide time and are off the air part of the time? A. But it is improbable that a station would operate only daytimes the whole year, because nighttime is the most valuable time.

Q. That is correct, but a certain hour they may be off the air a whole year and go to Rockford at that particular hour, 7 to 8 in the evening, we will say? A. Yes, that is true.

Q. And that is when those particular listeners might have said that they got your service—isn't that correct? A. Well, we undoubtedly would have received complaints of interference during other parts of the evening from other listeners.

Q. Do I understand, then, that you are merely contend-
ing in this hearing that you are complaining from
97 heterodyne interference, thereby reducing your
service area, and that comes from either WHBL or

KFLV? A. Yes, that is it. For some reason it seems that those stations do not interfere seriously with us, because we operated a whole year without interference from those two stations.

Q. As I understand, you made tests before and afterwards? A. Yes.

Q. And those two stations, closest stations, did not interfere at all? A. Yes; that is the idea.

Q. But I do understand that on the 1410 channel you get interference from the Montgomery station and the Mobile station? A. That is true.

Q. Both of which are eight or nine hundred miles away from your station? A. That is true.

Q. And they operate on 500 watts power, don't they? A. Yes.

Q. And if you go to 940 you have Hopkinsville with a thousand watts instead of 500 watts and only about half the distance of these two stations? Isn't that approximately correct? A. That is true.

Q. You still don't think that you will have any heterodyne interference from them? A. I know the interference that we noticed from the station WSFA and 98 Station WODX in Alabama must have been due principally to the reflected wave from those stations, and I believe for 1410 kilocycles that is approximately the distance where the wave is reflected back to earth at about the maximum intensity.

Q. But you don't think that you will get any heterodyne interference from WFIW at Hopkinsville? A. I don't think so, because we know that stations operating on 940 now are below audibility on an ordinary receiver, and we know that WSFA and WODX are very audible on 1410 on the ordinary broadcast receiver.

Q. Now, by "below audibility," as you say from your testimony, as I understand you, a signal of less than a thousand microvolts, less than one millivolt? A. Yes.

Q. Isn't that what you mean? A. Yes, very much below.

Q. You say that a millivolt is the minimum signal that is audible on an average receiver? A. Yes. It is very much less than that.

Q. You mean that signal is much less? A. Yes.

Q. But that is the kind of a signal that I understand then you are referring to when you talk about the 85-mile radius of good service? A. Yes, sir.

Q. Made a year or two ago? A. Yes.

99 Q. A signal of approximately one millivolt or a thousand microvolts? A. Yes, sir. We made no actual tests upon the——

Q. You did not make any field strength tests? A. That is the idea.

Q. But in your estimation as an engineer you feel that that is the minimum signal on the average receiver? A. Yes.

Q. So that is the kind of service that you are referring to on this 85-mile frame? A. Yes, entirely possible.

Q. And aren't you familiar with the fact that 500 microvolts or a half a millivolt is considered a very good signal in rural areas? A. My idea is based upon reports to the Institute of Radio Engineers.

Q. Have you any such report before you that says that 500 microvolts is not a good signal in rural districts? A. I started to say that it is generally understood that in a place where there is very little background noise it is necessary to have a field intensity of approximately one millivolt per meter for good, consistent reception.

Q. And are you familiar with the minimum signal that is audible in the average receiving set today? A. No, I am not.

Q. Well, if that were 20 microvolts would you say then that you would be able to receive a signal much less than a thousand microvolts in almost any receiver? A. Oh, yes, surely.

100 Q. If the minimum signal were 20 microvolts? A. Oh, yes.

Q. You are not familiar with that phase? A. No, I am not.

Q. And are you familiar with the fact that there has been field strength measuring devices in existence for the last three years that can measure signals down to 20 microvolts per meter? A. No, I am not.

Q. You are not familiar with that? A. No, I am not.

Q. And of course you did not use any of those measurements in arriving at these figures that you have submitted here today? A. No.

Q. You used receiving sets and depended upon your ear for detection of the signals? A. That is the idea.

Mr. Fisher: I think that is all.

Mr. Scott: May I ask the witness another question, Mr. Examiner?

Examiner Hyde: We will permit one more question.

Mr. Scott: I neglected it. I did not look at my notes. Otherwise I would have noticed it.

Mr. Fisher: Just one further inquiry and I am through.

By Mr. Fisher:

Q. And you say that WMBC at Detroit, 10 kilocycles removed from your present frequency causes a heterodyne? A. Yes.

Q. With your signal? A. Yes, a very serious
101 heterodyne.

Q. Is that a heterodyne or cross-talk? A. It is heterodyne.

Q. In what location did you observe that? A. In what is termed as the "thumb" part of Michigan.

Q. That is up around Sanilac? A. That is in that portion of the country, there and south of there, in our service area.

Q. Of, say, between you and Detroit? A. Slightly closer to us than Detroit, I believe.

Q. You are very sure that that is a heterodyne? A. Oh, yes; very sure.

Q. And not a cross-talk signal? A. Absolutely.

Q. Ten kilocycles removed? A. Ten kilocycles removed, and it was very noticeable. Whether WMBC was deviating from its assigned frequency I do not know; but I know the heterodyne is very, very noticeable.

Q. As a matter of fact, they would have to deviate almost ten kilocycles to get heterodyne, wouldn't they? A. Well, that heterodyne was of a higher frequency than a thousand cycles. It was a high-pitched heterodyne. At the same time, the intensity was so great that it made it disagreeable listening to our station.

Q. How many times did you find that condition existing? A. At two times. The observation I made at Sanilac and the observation that I made at Holly.

102 Q. You don't know whether that was due to the fact that they deviated from their assigned frequency or not? A. No, I do not. But I know they were the station causing it.

Q. You know they were the station causing it? A. Yes.

Q. That is all.

Mr. Scott: That last question was the one that I was intending to direct myself to the witness.

Cross-examination on behalf of Station WWJ.

By Mr. Scott:

Q. Where is the WMBC transmitter located? A. WMBC transmitter?

Q. Yes. A. I don't know.

Q. It is in Detroit?

Mr. Fisher: It is down town some place.

By Mr. Scott:

Q. You don't know whether it is located on a hotel down in the business section of Detroit? A. No, I don't know where it is located.

Q. But you do know that it is in Detroit? A. Yes.

Q. Do you know that? A. Yes, licensed for Detroit.

Q. What other way could you get a heterodyne from WMBC unless it is either your station or the WMBC station that was off its frequency? A. There would be no other possible way. 103

Mr. Scott: That is all.

Examiner Hyde: Any further cross examination?

Mr. Sutton: Yes.

Examiner Hyde: Let me suggest that you make this as brief as possible.

Cross-examination on behalf of Station WFIW.

By Mr. Sutton:

Q. I believe you testified that you figured one millivolt was about the lowest field strength value that you would consider for rural service? A. Yes.

Q. Do you know John V. L. Hogan? A. I have heard of him, yes.

Q. How do you regard him in the engineering field of radio? A. Very highly.

Q. Very highly. If Mr. Hogan testified that a 1000-watt station will produce a signal 10 millivolts a distance of nine miles, a signal of two millivolts at 45 miles, and a signal of 250 microvolts 45 miles, would you agree with that? A. I imagine that would correspond very closely to the average 1000-watt station.

Q. If he classified those as very good, good service, and rural service, would you still agree with that classification? A. Yes.

104 Q. If Mr. Hogan testified that a 500-watt station would render a signal of 10 millivolts, a distance of six miles, two millivolts at a distance of 30 miles, 200 microvolts at a distance of 300 miles, would you agree with that classification? A. Yes.

Q. What were the figures for the one kilowatt station? Figures were 10 millivolts at 9 miles, 2 millivolts at 45 miles, and 200 microvolts at 450 miles? A. Yes, I would.

Q. And that the 500-watts would be 200 microvolts at 300 miles? A. Of course, that varies with the frequency upon which the transmitter is being operated. The absorption is greater for higher frequencies than lower frequencies, of course.

Q. Now, you say you have read a good deal of the I. R. E. reports? A. Yes.

Q. Institute of Radio Engineers reports. Did you ever see any field strength formulas in those reports? A. Yes, I have.

Q. Essentially, what is a field strength formula? A. I cannot tell you offhand.

Q. Well, if you take a field strength formula of 2.9 times the square root of P, times the fraction 1 minus triple nought six to the D, all divided by the distance, would you agree to that as being an accurate field strength formula? A. I don't know.

105 Q. You don't know? A. No.

Q. Well, how would you determine the field strength? A. I know of no accurate way of determining it except by measuring it.

Q. You know of no accurate way of determining it? A. Yes.

Q. You would not agree with that formula for—— A. There are so many variable factors entering into it, such as the condition of the ground over which the measurements are being made, and the topography of the ground, and that sort of thing; and also the frequency upon which the measurements were being made. I don't see how any formula could be formulated that would be accurate for all frequencies and all different types of ground conditions that would exist.

Q. Do you know whether the Bell Telephone Laboratories have developed a formula which they state fits nearly all cases? A. I know there is an Englishman that has a formula with the curves of variable factors that is supposed to fit nearly all cases.

Q. You have never read the Bell Telephone Laboratories' formula in the Institute of Radio Engineers' proceedings? A. I have never seen it in the Institute of Radio Engineers' proceedings.

Q. Now you don't care to estimate what the field was that WFIW laid down? A. No.

106 Q. Would you think it was closer to one millivolt or closer to 250 microvolts? A. I have no way of determining that, no way of estimating it.

Q. Have you ever received any mail from listeners located in the State of Kentucky at your station? A. I couldn't tell you.

Q. You don't know? A. No, I don't know.

Q. Do you know anything about the radiation characteristic of the antenna system as to the propagation of sky waves? A. Yes, I do.

Q. What do you know about that? A. Various types of radiation systems have different characteristics, of course. Ordinarily a quarter-wave radiation system radiates a greater amount of energy into space and a correspondingly less amount in its horizontal radiation than a larger radiation system.

Q. What is the antenna system that you use? A. At the present time we have a quarter wave radiation system which is being used by a large percentage of broadcasting stations throughout the country. However, in the very near future we are going to conduct tests to determine what type of radiation system will increase our horizontal radiation and decrease the reflected radiation as much as possible.

Mr. Sutton: That is all.

107 Redirect-examination on behalf of the applicant.

By Mr. Le Roy:

Q. Mr. Carpenter, this variation in the antenna of the testing apparatus, is that sufficient to cause any variation in the fidelity of the work? A. No; it would cause no appreciable difference in the reception conditions at all.

Q. Now, Mr. Carpenter, why was any action on your part so long delayed on this application? A. Our action on this application was delayed because our original application, entered in February 1930, was contingent upon WWJ's application for 50,000 watts and a change of frequency from 920 to 1020 kilocycles, and our original application was contingent upon that. In case WWJ was assigned 1020 kilocycles, we were applying for the 920 kilocycle channel.

Q. When you said you got mail from all over the country, what did you mean, at rare intervals? A. At very, very rare intervals, yes.

Mr. Le Roy: That is all.

Mr. Fisher: That is all.

Examiner Hyde: I think he has been thoroughly examined. Call your next witness.

Mr. Le Roy: That is all.

Mr. Segal: No recross examination.

Mr. LeRoy: That is all. We have nothing further, Mr. Examiner.

Mr. Segal: I want to make a motion that the application be dismissed for failure to prove that no interference would result in the service area of WCSH in its present service area as a result of the granting of this application. 108

Mr. Sutton: May I support that motion and have it apply to WFIW?

Examiner Hyde: The motion will be overruled, as it applies to both movers.

Mr. Segal: That motion, as you know, is made under the provisions of General Order 40.

Examiner Hyde: I will state my reason for overruling the motion as that it would require a finding here and now, and I consider that evidence on this point should be reported to the Commission for them to make the determination.

Mr. Segal: May I now move that my motion be referred to the Commission?

Examiner Hyde: Overruled.

We come, then, to the cases to be submitted by the respondents. WHA appears first on the list.

Mr. Segal: WHA, of course, joins in the motion just made by WCSH and will place no testimony in the record.

Examiner Hyde: WFIW is next.

Evidence on Behalf of Station WFIW.

Thereupon **Robert D. Linx**, produced as a witness on behalf of respondent station WFIW, having been first duly sworn, was examined and testified as follows:

Direct examination.

By Mr. Sutton:

Q. What is your name and occupation? A. My
109 name is Robert D. Linx; chief engineer of WFIW, Hopkinsville, Kentucky.

Q. Your qualifications, Mr. Linx? A. I graduated from Riverside High School, Milwaukee, Wisconsin in 1920. Attended Marquette University Engineering School from 1920 to 1922.

I built radio station WIAO, now WISN, in 1921. Also helped construct WHAD, the Marquette University station, in 1923.

Continued in radio work upon my removal to Nashville in 1924. Owner of a radio repair company until 1926.

Worked for WLAC as relief operator for about one year. Started as control operator in 1928 for WLAC and continued working there until August 1930. During 1929 worked as combination control and transmitter operator.

In August 1930 became connected with WFIW as chief engineer.

I built and operated 9 ALY and 9 AGD, Milwaukee, Wisconsin; W4AHB, Nashville, Tennessee; and at present owner of W9GOB at Hopkinsville, Kentucky.

Q. What as an engineer do you know about the quality of radio waves, generally, north and south of the central plains states, Mississippi Valley? A. Transmission in and around the Great Lakes region is southward, around the Mississippi Valley transmission is north and south.

Q. With relatively greater intensities or not? A. Greater intensity, yes, sir.

Q. Have you ever heard WBCM? A. Yes, sir. WBCM is heard frequently in Hopkinsville and also in
110 Nashville, Tennessee, with loud speaker volume.

Q. Have you ever heard Station WDAY? A. Yes, sir; WDAY comes in with about the same degree of volume that WBCM does in Hopkinsville, Kentucky, and also in Nashville.

Q. Do you know whether or not WFIW lays down a strong signal in the region of the Great Lakes? A. I know they do, and the reason I know they do is because of the volume of mail received by WFIW from the Great Lakes region regarding reception, and also the fact that WDAY and KFYR at Bismarck, North Dakota, were forced to ask WFIW to sign off for reasons of interference.

And third, Great Lakes stations lay down exceedingly loud signals on all frequencies in Hopkinsville. In fact, these signals from these stations are by far the strongest of any group of stations in the immediate vicinity of WFIW.

Q. In your opinion what would be the result if WBCM were allocated to operate on 940 kilocycles? A. There would be serious interference to WFIW, WDAY, and WCSH, and also terrific interference to WBCM, as they are only 500 or so miles from WFIW and only slightly farther from WCSH and WDAY.

Q. What do you know about the equipment of WBCM? A. I know that the basic transmitter was purchased from the Life and Casualty Insurance Company, owners and operators of WLAC, Nashville, Tennessee. The equipment at that time was one kilowatt Western Electric transmitter,

with speech equipment, and had been jointly used by
111 WDAD and WLAC on 1330 kilocycles. WDAD was absorbed by WLAC, and a short time later the present equipment of WLAC, a 5-kilowatt Western Electric set, was installed. At that time this one kilowatt equipment was not crystal-controlled, and the installation of the one-kilowatt set at that time was made by F. D. Binns, of WLAC, in conjunction with engineers of WBCM.

Q. Now, Mr. Linx, you spoke just a minute ago about having to shut down, or at least being requested to shut down by Station WDAY. A. Yes.

Q. Will you go into that further? A. All right, sir. During the last part of November 1930, a phone call was received by WFIW, 940 kilocycles, Hopkinsville, Kentucky, from the management of WDAY, 940 kilocycles, Fargo, North Dakota. This call was received at 11:30 P. M., Central Standard Time. In the conversation that ensued, the following information was given:

A blizzard was in progress in North Dakota and surrounding states, which was so terrific that all wire communications were impossible. Trains could not be dispatched, and movements of all trains practically at a standstill, due to the failure of wire communication. The telephone call itself was routed from Fargo to Hopkinsville via Canadian lines. The management of WDAY requested WFIW to sign off at 12:00 midnight so that they, WDAY, could dispatch trains and so forth, by direct radio communication with KFYR, Bismarck. This arrangement was impossible at the time of call, because of WFIW's interfering signal in North Dakota.

112 Promptly at 12:00 midnight WFIW's transmitter was taken off the air, and the announcement was made at time of signing off by D. E. Kendrick, station director, that WFIW engineers would "stand by" to help relay messages, if necessary.

As chief engineer of WFIW, I immediately tuned to WDAY, at Fargo, North Dakota, using a standard Western Electric 4-D receiver, employing 6-215-A tubes, a superheterodyne circuit.

WDAY's signals were heard on this set very easily, and accompanied with little or no fading. Their signals were listened to for several hours, and were of such intensity that they were run through an 18-B Western Electric amplifier, which is used for monitoring purposes. The signals were then heard on speakers easily and clearly. My assistant engineer also stayed with me, as well as our station director, D. E. Kendrick.

Because of this interference, it being impossible for WDAY to go ahead with their communications with KFYR, while WFIW was on the air, our station lost many hours of operation.

Q. Who owns WFIW, Mr. Linx? A. WFIW, Hopkinsville, Kentucky, is owned and operated by WFIW, Incorporated. The stockholders of WFIW, Inc. are the holders of the Acme Mills, Hopkinsville, Kentucky. The stock of WFIW, Inc. is apportioned equally according to the holdings of the Acme Mills stock held by these stockholders.

Q. What about the section around Hopkinsville, Kentucky? Is it thickly or sparsely populated? A. Very sparsely in the southern section, where people depend mainly on radio for entertainment.

Q. What do you think would happen if Station
113 WBCM, located in Bay City, Michigan, about 500
miles away from you, was allocated to operate on 940 kilocycles? A. I think that listeners in Kentucky, northern Tennessee, southern Illinois and Indiana, would be greatly hampered in the reception of WFIW if WBCM, as close as they are, were placed on this frequency.

Mr. Sutton: That is all.

Examiner Hyde: Counsel for the applicant may cross-examine the witness.

Cross-examination on behalf of the applicant.

By Mr. Le Roy:

Q. Mr. Linx, do you know what improvements have been made to this apparatus, transmitter you were speaking of? A. You mean since it was purchased?

Q. What time are you speaking of in your statement? A. What time?

Q. Yes. A. I believe it was in 1928. I am not certain exactly as to the date.

Q. Do you know that it now has crystal control? A. No, sir; I do not.

Q. High modulation panel and modern in every respect. How large a service area do you have, Mr. Linx? A. About 125 miles.

Q. That is nighttime or daytime? A. That is daytime. Nighttime I imagine about, conservatively, 175 to 200 miles.

Q. How do you know it is that large? What do 114 you base that on? A. I base that on mail received directly from listeners to our station and checked very frequently. In fact, it is checked every day. I check most of the mail myself.

Q. Have you made any surveys to establish the range? A. No, sir.

Q. How much population do you serve in that area? A. I should say about from 150,000 to 200,000 people.

Q. What type of program do you put on? A. I don't understand exactly what you say.

Q. What type of program? A. What type? We put on—you mean as to the program itself?

Q. Yes, the nature of it? A. Put on sustaining programs from studios of all types, plays; we carry the farm talks, and also information for farmers. We carry a certain amount of educational programs and carry three church programs each Sunday.

Q. Have you a copy of your programs to put in evidence here?

Mr. Sutton: I intend to introduce Mr. Kendrick's testimony, dealing with programs, given at another hearing. I will offer it just as soon as this witness is off, as the manager of the station itself is sick and cannot appear here.

Mr. Fisher: Programs? What for?

Mr. Sutton: Of this station.

Mr. Fisher: A protesting station?

Mr. Sutton: Yes.

Mr. Fisher: I don't think that is admissible. The 115 sole question is interference, of course.

Mr. Sutton: It is the sole question, but he was asking for programs.

Mr. Fisher: Oh, I see; pardon me. I thought he was putting another witness on.

By Mr. Le Roy:

Q. How many hours of phonograph records and transcriptions have you, Mr. Linx? A. Per day?

Q. Per day. A. Approximately two hours. One hour in the morning and one hour at the last part of our broadcast at 1 to 2.

Q. Do you have a chain affiliation? A. No, sir.

Q. What is the nature of the rest of your time? How many hours do you operate altogether? A. Twelve hours a day. Operate from 7 to 9 in the morning and from 10 to 2, and from 6 to 12, and it is filled with varied programs, orchestra programs, and it is pretty hard to detail all the programs. Plays.

Q. What kind of sponsored programs do you have in the evening? A. We have different sponsored programs. Of course, that is outside of my line. We have one program sponsored by National Protective Insurance Company, an hour in the evening. We have several programs nightly sponsored by the Bureau of Broadcasting.

Q. Do you have any psychologists on your program? A. We have now; yes, sir.

116 Q. What does that consist of? A. Answers to questions and the sale of books by the psychologist himself.

Q. What kind of books? A. I don't know. I have never seen any of them myself. Books on psychology, so I understand.

Q. How much time is given to that on the average, do you know? A. Half an hour.

Q. A day? A. Yes, sir.

Q. Once a day, or several times? A. Once a day.

Q. You have experienced considerable interference from WDAY, did you say? A. No. I said that when we signed off it was very easy to pick up their signals loud enough to run them through our amplifier and be heard on the speakers.

Q. In your opinion how much more interference would be suffered from WBCM and WDAY? I mean, considering the distance. A. Well, I imagine that there would be greater interference from WBCM than there is at present from WDAY, due to the fact that WBCM is somewhat closer and more in a direct line with the station.

Q. How much closer is it, do you know? A. About 120 miles, I should say.

Q. Do you know what the relative power of the two stations is? A. You mean WDAY and WBCM?

117 Q. Yes. A. WDAY is a thousand night, 2500 day, and WBCM, I understand, is 500.

Q. Still you think there would be more interference from WBCM at 500 watts than from WDAY at a thousand? A. Yes, sir.

Q. And on what do you base that? A. Just experience in listening to stations around the Great Lakes, the way they come in in Hopkinsville. Practically all the Great Lakes stations at 500 watts or over come in there most consistently of any group of stations in the country.

Q. How do you explain, Mr. Linx, that you have a service area of 125 at night—did you say 170 or 125? A. 175.

Q. When WDAY comes through as strongly as you indicate? A. Well, I don't mean to say that WDAY comes in probably consistently in our section. However, the times that I have picked them up I have heard them fairly well with good head phone volume on the 4-D and we have had some letters from listeners regarding WDAY's signals on our frequency; that is, interference between the two stations.

Q. It does not come in with any degree of regularity, then? A. I couldn't say, because I have not listened to them regularly myself.

Mr. Le Roy: That will be all.

Examiner Hyde: Any further cross examination? Anything further, Mr. Sutton?

118 Mr. Sutton: Nothing further of this witness. Mr. Felix.

Thereupon **Edgar H. Felix**, produced as a witness on behalf of the respondent station WFIW, having been first duly sworn, was examined and testified as follows:

Direct examination.

By Mr. Sutton:

Q. Give your name to the reporter, Mr. Felix. A. My name is Edgar H. Felix, and I reside at 202 Beechwood Road, Ridgewood, New Jersey.

Mr. Sutton: Will counsel for all concerned waive Mr. Felix's qualifications?

Mr. Segal: I will concede them.

Mr. Scott: As what? As a radio engineer?

Mr. Fisher: Yes.

Examiner Hyde: Does the applicant concede Mr. Felix's qualifications?

Mr. Le Roy: I don't know Mr. Felix. I would like to hear what some of the qualifications are.

By Mr. Sutton:

Q. All right; give your experience in radio engineering matters, Mr. Felix. A. I have been actively and continuously interested in radio communication since 1912 and professionally engaged in the art since 1916, when I secured a first-grade commercial wireless operator's license and took a few voyages pounding the key.

119 I studied electrical, radio, and general subjects as a special student of Columbia and New York Universities, and at Sheffield Scientific School, Yale.

During the World War I was engaged as a radio engineer by the Radio Development Section of the Signal Corps, attached to the Bureau which farmed out research work to the laboratories of radio and electrical manufacturers, and later I was sent for special training to the Signal Officers' School, at Yale University.

Mr. Le Roy: I will waive any further qualifications.

By Mr. Sutton:

Q. Now, Mr. Felix, have you made an examination of the assignments at 940 kilocycles? A. Yes, sir.

Q. What stations operate thereon? A. The channel occupied by WFIW, 940 kilocycles, has now assigned to nighttime operation, WDAY, Fargo, North Dakota, 1000 watts unlimited time; and WCSH, Portland, Maine, 1000 watts unlimited time. These stations are approximately 880 and 1020 miles, respectively, from WFIW's location.

Two other assignments in the Fifth Zone are at such a distance that they are not of material consideration in connection with the application being heard.

Q. Do you consider the allocations made on 940 kilocycles advantageous to the listener? A. Considering the average standard of allocation on regional channels, the 940 kilocycle channel is one of the most satisfactory, from the rural standpoint, of any in the broadcast spectrum. It is particularly fortunate, therefore, that it should be 120 occupied by stations rendering an extensive and needed rural service, serving territories which do not have an excess of broadcast facilities.

In sparsely populated areas distant from major broadcasting centers, the listener is accustomed to utilizing a signal intensity of a far lower order than is considered necessary for high quality service in the more populated parts of the country where many broadcasting stations lay down relatively high field strengths.

Q. How does the character of territory served affect the allocation with respect to the type of service required? A. The territory surrounding the Portland, Maine; Fargo, North Dakota, and Hopkinsville, Kentucky, stations is distinctly rural in character. None of them are near broadcasting centers. Therefore, in considering the possibility of placing additional stations on the channel involved, not only must the high grade service area of the stations already utilizing it be considered, but also the effect of such additional stations upon all areas receiving more than 100 microvolts per meter.

By Mr. Fisher:

Q. Hundred microvolts? A. Yes, sir.

Without accurate measurement it is difficult to estimate with any degree of reliability how extensive that range is. The low attenuation of radio signals in the Mississippi Valley is well known and the relatively low frequency of 940 kilocycles involved are both factors which contribute to extending the distance that a given field may be
121 expected as compared with the average result attained in practice.

The same factors also apply to both the applicant and the existing stations so that the resultant mileage separation does not reflect fully the actual effect of a 500-watt station at Bay City, Michigan, on the channel. The distance from Bay City, Michigan, to Hopkinsville, Kentucky, is 510 miles, while that from Bay City to Portland, Maine, is 660 miles. The recommended separation, as determined from the compilation prepared by the Engineering Division of the Federal Radio Commission, for a 500 and 1000-watt station occupying the same channel for nighttime operation, is 1050 miles, or approximately double that involved in this application. Since it is clear because of the character of the terrain and the well-known low attenuation of the low frequency involved, there appears to be no justification for considering the recommended separation in this instance as conservative.

It frequently happens in special cases that the recommended separation can be wa-ved, particularly in the case of channels already so congested that low field intensity laid down by existing stations cannot be utilized. Those conditions, however, do not obtain in this instance since the channel is relatively free from heterodyne interference.

While I hestitate to hazard any predictions to the field strength which would be laid down by the 500-watt transmitter at Bay City, Michigan, down the Mississippi Valley, that it would be of an order which would limit WFIW to serving 30 miles at night is a practical certainty, in view of the conditions as they are known.

122 It would not be unusual or unexpected if WBCM would frequently deliver 200 microvolts per meter at night at a distance of 400 miles, although this estimate, of course, is based, not upon the regular service conditions, but upon those which apply on good winter nights. Such a field strength would certainly eliminate WFIW as a service signal at the distance involved which is 110 miles from WFIW's transmitter and would cause destructive interference for an additional 50 miles and probably more.

The effect of the signal of Bay City, Michigan, would not only be manifest in the territory lying between the two stations, but also to the east and west of WFIW, where less than 1000 microvolts per meter is delivered. There is no question that similar results would be experienced in the territory surrounding Fargo, North Dakota, which is dependent very largely upon that station for reliable service and a rural area where radio listening is certainly a more important factor in the life of the community than in populous centers.

In view of all of these circumstances, I am convinced that the granting of this application would involve a serious deprivation of service to those now enjoying a useful signal from WFIW.

Q. Now, just a question or two, Mr. Felix. You have had considerable experience with radio receiving sets and their response to various field strengths, haven't you? A. Yes, sir, I have.

Q. In your opinion, using a Philco modern superheterodyne receiver, what would be the minimum field 123 strength detected? A. Well, if a Philco is a sample of the average receiver, it is possible to secure an intelligible, though certainly not an enjoyable, signal at 50 microvolts per meter.

Q. From 50 microvolts per meter upward? A. Upward.

Q. Do you know anything about this Western Electric 4-D receiver? A. Yes, I am familiar with it.

Q. What do you think would be its response to signal strength? A. Well, my observations with that receiver are hardly sufficient to justify a very firm estimate. I do not consider it as sensitive as the average commercial receiver today as a loop receiver. It might respond to a hundred microvolts. It is not exactly an insensitive receiver, but on the other hand, it is not an exceedingly sensitive receiver or outstandingly sensitive receiver.

Q. Do you know of any receiver on the market today that is in common use that would not respond to signals of less than a millivolt? A. There is no such receiver being manufactured in quantity or that is known to the industry.

Q. What kind of a signal would one millivolt be in the way of service to the listeners? A. A one-millivolt signal is considered the limit of the high-grade service range of a broadcast station. It is a very strong signal—or 124 I should say a fairly strong signal, and entirely satisfactory in suburban communities.

Q. And the signal, in your opinion, if I get it correct, of one millivolt would easily be heard on a Western Electric 4-D receiver or any of the commercial receivers now? A. Without the slightest difficulty.

Q. Without the slightest difficulty? A. Without the slightest difficulty.

Q. And if you would go to the lower range of audibility where you would just hear the signals it would be in the neighborhood of something like 50 microvolts? A. Fifty microvolts.

Q. Or one-twentieth of that? A. Yes, that is true.

Mr. Sutton: That is all.

Examiner Hyde: Counsel for the applicant may cross-examine.

Cross-examination on behalf of the Applicant.

By Mr. Le Roy:

Q. Mr. Felix, in your answer about the use of the 4-D receiver did that apply to the use of it with a loop or with an antenna? A. With a loop; yes, sir. I have used it with a loop, but I am not familiar with it with an antenna.

Q. Would it be possible with the use of that receiver in connection with a hundred foot antenna to produce an effective test? A. Naturally, its pick-up would be greatly improved if it had more energy supplied with a re-
125 sponsive antenna system.

Q. What is your prediction as to the possible field strength of this signal coming from WBCM based on? A. Of what value or what distance?

Q. Interfering with WFIW, coming into the service area. A. Well, whenever the interfering signal, that is, the signal from WBCM, reaches the value from one-fiftieth to one-hundredth of that delivered by WFIW, heterodyne interference would begin to be noticed, which would increase progressively as the ratio was increased.

Q. Have you made any actual surveys or tests in this particular area and terrain? A. No, I have not made any tests.

Examiner Hyde: Any cross examination, Mr. Fisher?

Mr. Fisher: No questions.

Mr. Scott: No cross examination.

Mr. Segal: No questions.

Examiner Hyde: Mr. Sutton, redirect.

Mr. Sutton: No questions.

I would like to introduce the testimony of Mr. D. E. Kendrick given in a case, Docket No. 980, WIOD, applying for 940 kilocycles. This testimony is from pages 58 to 70 and includes the direct, the redirect and all the cross examination. This deals particularly with the program material sent out by Station WFIW and gives in detail that matter.

Mr. Le Roy: That is hardly in order, is it, Mr. Examiner? We do not have an opportunity to cross-examine this witness and develop the nature of that program.

126 Mr. Sutton: I think it has been the practice, Mr. Examiner, under the rules and regulations that you can do that.

Examiner Hyde: I understand the reason for the offer being made, in view of what was the practice here, but the objection made to this offer is sustained.

Mr. Sutton: Very well; that is all on behalf of WFIW, Mr. Examiner.

Examiner Hyde: The next respondent on the list is WCSH.

(Discussion off the record.)

Examiner Hyde: Counsel for the Commission may introduce his evidence at this point, so that Mr. Ring will be available for other cases tomorrow.

Evidence on Behalf of the Commission.

(This witness out of turn.)

Thereupon **Andrew D. Ring**, produced as a witness on behalf of the Commission, having been first duly sworn, was examined and testified as follows:

Direct examination.

By Mr. Fisher:

Q. State your name, residence and occupation to the reporter. A. Name, Andrew D. Ring; residence, Washington, D. C.; occupation, senior radio engineer, Broadcast Section of the Federal Radio Commission.

Q. How long have you held that position? A. Since July 1, 1929.

127 Mr. Fisher: Are there any objections to his qualifications in this case?

Mr. Le Roy: No.

Mr. Segal: They are conceded.

By Mr. Fisher:

Q. Mr. Ring, have you examined the records of the Commission with regard to interference if WBCM were granted their application to change their frequency from 1410 kilocycles to 940 kilocycles? A. Yes, sir.

Q. And what do you find on the same frequency of 940 if this change is permitted? A. I find that the closest station to Bay City, Michigan, on the frequency of 940 kilocycles operating full time is WFIW at Hopkinsville, Kentucky, a distance of 515 miles. The power of WFIW is 1000 watts.

The next closest station is WCSH at Portland, Maine, a distance of 680 miles. WCSH is licensed to operate with a power of 1000 watts.

The next closest station is WDAY at Fargo, North Dakota, a distance of 690 miles. The licensed power of WDAY is 1000 watts.

The recommended separation between a 1000-watt station and a 500-watt station operating on the same frequency under average conditions to prevent interference in the good service area——

Q. At night. A. At night—of either station is 1050 miles. The actual separation with the Hopkinsville station is only approximately half this distance. So if usual efficiencies and propagations exist, it would be expected 128 that interference would be had with the station operating on the proposed frequency and also limiting the present service area of WFIW.

Q. And have you any record with regard to adjoining frequencies, 10 kilocycles removed, 10 and 20? A. On the adjoining frequency 20 kilocycles removed Station WWJ at Detroit is licensed to operate with a power of 1000 watts. The recommended separation between a 1000-watt station and a 500-watt station 20 kilocycles removed in frequency for night operation is 150 miles. The actual separation between Bay City and Detroit is approximately 95 miles.

Therefore, on the average receiver under average propagation conditions that exist at night, cross-talk interference would be expected, limiting the good service area of both stations.

Q. Do you find any other stations there in which there might be expected to be interference in the service area of either station if this frequency is changed? A. No, I see no other stations with which under average conditions I would anticipate any interference in the good service areas.

Mr. Fisher: That is all.

Examiner Hyde: Counsel for the applicant may examine the witness.

Cross-examination on behalf of the applicant.

By Mr. Le Roy:

Q. Have you made any actual tests or surveys in this particular area, Mr. Ring? A. I have no actual survey made in the Bay City area. My opinion to some 129 extent is based on the official reports of the Department of Commerce, Radio Division, from which we have field strength measurements made of stations in the service area.

Q. Have you the quota figures for the two states? A. Yes.

Q. Is Kentucky over quota or under quota? A. Kentucky is over quota .08 unit.

Q. Is Michigan over quota or under quota? A. Michigan is under quota by 2.58 units.

Q. How about North Dakota? A. North Dakota is over quota by .40 unit.

Q. And the State of Maine?

Mr. Segal: I want to state an objection at this time. If there be any merit to these quota systems there is no application in this case, because the granting of this application will in nowise tend to increase the quota of the State of Michigan.

Furthermore, if it be true, as the testimony now commences to show, that increased interference would be caused with the operation of the existing stations on this frequency, neither the Commission nor Congress has the power, either by the Davis Amendment or by the quota system, to interfere with the operation of existing stations purely for the purpose of obtaining some mathematical quota or approximating it.

Furthermore, because the quota system upon its face is not prepared pursuant to the Davis Amendment, does not tend to equalize the distribution of frequencies, 130 power, hours of operation, and station assignments, between the zones or fairly and equitably among the states, according to the population; but upon its face is contrary to that standard, that being the standard delegated by Congress to the Commission to be applied.

Examiner Hyde: The objection is made after the quota has been stated into the record.

Mr. Segal: No; I saved the objection until he began to ask about Maine. He has not given that.

Mr. Le Roy: I will waive it as to Maine, Mr. Examiner.

Examiner Hyde: The objection is overruled, for the reason that the record by the Commission's course of procedure automatically contains all of this information which has been added here in part, so that whatever ruling was made on the objection, the result can still be that they may be before the Commission.

Mr. Segal: That being the case, they are of course in the record automatically under the General Order, without opportunity for us to object or be heard in any manner.

(Discussion off the record.)

Examiner Hyde: Let us proceed with the hearing.

Mr. Le Roy: No further questions.

Examiner Hyde: Any further cross examination of Mr. Ring?

Mr. Scott: Yes, I would like to ask him:

Cross-examination on behalf of Station WWJ.

By Mr. Scott:

Q. In regard to the quota of Michigan you gave 131 the total under quota status of the state. Will you read into the record the quota status of the state as far as regional classifications are concerned? A. Michigan is due on regional channels 4.51 units; assigned 3.70 units; or 1.81 units under quota.

Cross-examination on behalf of Station WFIW.

By Mr. Sutton:

Q. You are familiar with the ordinary commercial receiving sets that are on the market, aren't you, and their responses to various field strength? A. Yes, sir; I think I have a fair knowledge of them.

Q. A receiving set such as a Philco, Mr. Ring, in your opinion as an engineer, and your experience, what would be the lowest signal it would respond to that you could ordinarily detect by the human ear as it passes beyond the audibility, in terms of field strength? A. The particular model of Philco that may be referred to, of course, I don't know; but that line of receivers has a general sensitivity such as a field between 5 and 20 microvolts per meter will produce an audible loud speaker signal.

Q. What kind of an effect would you think a field strength signal of one millivolt would give in that? A. One millivolt would give a very satisfactory signal if the ordinary listener's set is in proper operating condition.

Q. Do you know anything about the 4-D Western Electric receiver? A. Yes; I have had some experience with that.

132 Q. What about that? A. It is generally considered somewhat more sensitive.

Q. Would it respond to field strength of the order such as you have mentioned, around 20 microvolts? A. Yes, it will respond to that.

Q. You could hear a signal of approximately that field strength? A. With a fair degree of audibility, I should say.

Q. In other words, you could recognize the call letters of a station? A. I think so, very easily.

Q. Mr. Ring, you know something about field strength formulas, don't you? A. Yes.

Q. What about a field strength formula 2.9 times the square root of P, times the fraction 1 minus triple nought six to the D, all divided by the distance? How would you regard that as a field strength formula in accuracy? A. That formula was made up by me in an endeavor to arrive at an average for the sky wave propagation. Since making that formula, much more accurate measurement data has become available, and other formulas have been made up that give somewhat less fields and that appear to be more nearly average conditions that are had.

Q. According to that formula what field strength would a one-kilowatt station lay down at 500 miles? For instance, WFIW, what field strength would it lay down at Bay City, Michigan? A. I don't have that before me. It would

133 take some moments to calculate it. (After calculating:) On the basis of this formula taken from this graph, a field of 300 microvolts per meter might be expected when full propagation is had.

Q. One kilowatt at 500 miles? A. Yes.

Q. How much do you think that should be reduced, Mr. Ring, that 300 microvolts? A. Under later averages which are compiled on many more readings than were available at the time of making that curve, has reduced the one kilowatt at 500 miles to approximately 100 microvolts per meter, if I remember correctly. Now I am trying to give some work that I did some two months ago, and that figure is subject to correction.

Q. Mr. Ring, in your opinion what ratio should there be between desired and undesired signal on the same channel from a listener's standpoint? A. If the heterodyne note has a frequency of 500 cycles, which is the average that would be expected from the maximum deviation now permitted under General Order 7, is had, the ratio should be approximately a hundred to one to not be considered seriously objectionable.

Q. Then you would consider that if this station laid down a signal, if WFIW laid down a signal of something like 100 microvolts in and around Bay City, Michigan, heterodyning would be objectionable where the signal strength of WBCM was less than 10 millivolts? A. Less than 10 millivolts, if that heterodyne note was of a 500-cycle frequency order.

134 Q. How far would you expect WBCM to lay down a signal with a power of 500 watts and have a field strength of 10 millivolts? A. Average 500-watt station I estimate would have a field strength of 10 millivolts per meter for a distance of 6½ miles.

Q. 6½ miles. Would you, therefore, say that in this condition you would expect heterodyning to occur at limits beyond 6½ miles from WBCM? A. If the average propagation is had and the frequencies are 500 cycles different.

Q. Now, reversing that same proposition to Station WFIW, if you could go ahead with it without question and answer what would — say on this basis? A. The reverse would be expected, so that the service radius of WFIW would be limited to approximately the same distance.

Q. The station at Bay City, Michigan, is only 500 watts? A. Yes.

Q. Yes. A. Then corresponding it for 500 watts for the Bay City, Michigan, station, the service area of the Hopkinsville station would not be limited quite so much, probably 10 or 15 miles, on the basis of the figures I have given.

Mr. Sutton: That is all, Mr. Ring.

By Examiner Hyde:

Q. I would like to have that last answer explained to me—"limited 10 or 15 miles." Limited to 10 or 15 miles
135 from the transmitter or curtailed 10 or 15 miles? A. The good service of the station would be limited to 10 or 15 miles from the transmitter.

Redirect examination on behalf of the Commission.

By Mr. Fisher:

Q. In other words, that is where heterodyne interference would set in? A. Proceeding from the transmitter in a straight direction 10 or 15 miles, you would encounter such areas as would experience that interference.

Mr. Fisher: That is where the signal of one to a hundred comes in.

Mr. Sutton: Yes.

Recross-examination on behalf of Station WFIW.

By Mr. Sutton:

Q. In other words, beyond the 10 or 15 miles you would encounter heterodyne interference of a greater order than one to one hundred; is that correct? A. Yes, and of an objectionable nature.

Q. Then I take it from that, Mr. Ring—if I am correct you state so, and if not, explain—that the WFIW service area would be cut down to a point where only extremely low service would exist, and beyond that area would be heterodyne, and it would not have what you might call a graduated service area where the signal was less and free from interference? A. Yes. The good service area
136 would be limited to that area bounded by a radius of 10 or 15 miles.

Q. Then outside of that where you would ordinarily expect less service if there were no heterodyning, there would be heterodyning present? A. Yes.

Mr. Sutton: That is all.

Examiner Hyde: Counsel for WCSH, any cross examination?

Cross-examination on behalf of Station WCSH.

By Mr. Segal:

Q. Mr. Ring, you testified that you recommended a separation of 750 miles between 1000-watt and 500-watt stations under average circumstances. If there were any departures from the average that figure should be modified, should it not? A. According to the conditions found to be existent, yes.

Q. That would be modified for exceptional conditions of terrain and transmission characteristics? A. Yes.

Q. I observe you have a map in your notebook. Is that a topographic map showing outlines of major rivers? A. Yes, I have such a map.

Q. Will you lay upon that map a straight edge between Bay City, Michigan, and Portland, Maine? A. Yes.

Q. What departures do you find there from average transmission conditions? A. Proceeding eastward from Bay City, the territory appears to be very flat until 137 approaching the central portion of New York State, in which there are certain mountains rising to an altitude of approximately 2,000 feet; and again, further eastward, in Vermont there are mountains rising to an altitude of approximately 2,000 feet, and in central New Hampshire there are similar mountains. The propagation, of course, of the sky wave may not be materially affected by intervening mountains.

Q. Do you find any water bodies intervening? A. The water bodies are Lake Huron and Lake Ontario, the northern edge of Lake Ontario and directly across the lower part of Lake Huron.

Q. Is it not true that about 200 miles of this intervening space between Bay City and Portland is over water? A. Roughly that figure looks to be accurate.

Q. The attenuation over water is very much less than over land, is it not? A. But again that water falls within the area of the interference that would be caused by the sky wave, and whether or not the presence of water, on which the ground wave absorption is low, would affect the sky wave may be a question.

The territory immediately around Bay City I know from having been in there is very sandy and subject to very high absorption. That may give rise to less than normal propagation from this area, maybe much less.

Q. The testimony in the case, though, so far indicates, so far as the engineer from the station testified, that the propagation in his area was very good, and I was wondering about its application in an easterly direction.

138 The testimony shows, Mr. Ring, that prior to certain acts complained of there were stations located with power of 500 watts at Sheboygan, Wisconsin, 180 miles from Bay City, and one 500-watt station at Rockford, Illinois, located 260 miles from Bay City, both of them having a large part of their separation over water.

With a situation like that prevailing on WBCM's frequency, would you expect, in the ordinary course of events, that that station could not enjoy a reliable service area having a radius of 85 miles? A. It is not seen how such a service radius without interference could be experienced by the station if the Sheboygan and Rockford stations are operating with any degree of efficiency and with the usual antennas found that give out the sky wave and ground wave propagation.

Q. Even assuming that it had had such a service area, do you feel that a reliable service area on the basis of the figures that were given by Mr. Sutton could be had by a station at a radius of 85 miles if it were transferred to the 940 kilocycle frequency? A. I did not follow that.

Q. If WBCM under present conditions were to be moved to the 940 frequency do you anticipate that it could ever have a service area of 85 miles' radius on that frequency on the basis of the figures you gave Mr. Sutton? A. On any figures I do not see how the station could possibly accomplish a good service radius of 85 miles, in view of the information at hand on the present service areas of that station and on that channel and other channels.

139 Q. It is true, is it not, that interference would be caused by the carrier wave at a far greater distance than the limits of its service area, producing a nuisance area that might be expected far greater than the service area, is it not? A. Yes.

Q. And therefore, a great many points where the carrier can affect the reception on the same frequency but the station cannot itself be heard in the ordinary course of operation? A. In the ordinary line of listening for it you may not notice it, but of course it can be detected.

Q. What is the method of detecting an unmodulated carrier? A. Set up equipment to receive the carrier of a sensitive nature and a means of heterodyning that carrier.

Q. What is the usual method of doing that, an external oscillator? A. The usual method is to employ an external oscillator of low power that can be accurately tuned to the frequency that it is desired to heterodyne.

Q. You stated to Mr. Sutton a few moments ago that you are familiar with the design and construction of the Western Electric 4-D receiver. Assuming that a person were to take such a receiver, rearrange it so that the second detector can be put in an oscillating condition, would you say that was a fair way of searching for heterodyne? A. I do not see that that would give as sensitive a means of
detecting heterodyne so that it would receive the de-
140 sired frequency, rather than the intermediate fre-
quency that is generated in the receiver.

Q. Do I understand from what you have just told me that the second detector does not beat at the received frequency? A. It would necessarily beat at the intermediate frequency used in the superheterodyne.

Q. Approximately what is that? A. It may be in order of 100 kilocycles, or 75 kilocycles. I don't know the exact frequency of the receiver in question.

Q. In ordinary heterodyne interference in broadcasting what you do when a carrier comes in is an external oscillator? What is the effect of it? A. That is our generally accepted means of accurately detecting signals by the heterodyne method.

Q. Is it a fair test in searching for probable heterodyne on a frequency to test it for six days during six successive nights during the month of April? From what can it be deducted what will happen year in and year out? A. Under average conditions six days during the month of April in my opinion are not sufficient to accurately predict what may happen during the greater portion of the year.

Mr. Segal: I think that is all.

Examiner Hyde: We will come back to the Commission counsel. No further questions?

Mr. Le Roy: One additional question, Mr. Examiner.

141 Recross-examination on behalf of the Applicant.

By Mr. Le Roy:

Q. Mr. Ring, I think there is testimony in here to the effect that WFIW's signals were inaudible on the Philco receiver. Could it be presumed from that that that was less than a 5-microvolt signal coming in there? A. The sensitivity of the receiver used I, of course, do not know. The state of the tubes used and the tune of the condenser, the effective height of the antenna, and so on, all of that must be known before an answer can be given. If given an average installation, running with good efficiency, having an antenna effective height of approximately four meters, such a conclusion could be drawn, but that must be available.

Q. It was a hundred-foot antenna, I think, Mr. Ring. A. Well, a hundred-foot antenna—that information alone will not give you the effective height of the antenna.

Q. Mr. Ring, the testimony in the case is to the effect that the nighttime range of WFIW is 175 miles. Assuming that that is a 1-kilowatt station, as it is, and WDAY a 1-kilowatt station; is that a reasonable deduction or not? A. The estimate of 175 miles for WFIW, I think, is extremely high. I have listened myself approximately 85 miles from WFIW and found the night service to be entirely destroyed by heterodyne interference, and the heterodyne note was of a low order, so that the ratio of the signals was much less than a hundred to one.

142 Q. In your opinion what would be a reasonable service area under those conditions? A. The reasonable service area for a 1-kilowatt station on that frequency, from what I know, having listened to the station, and other data from my records, I would estimate possibly 25 to 50 miles.

Mr. Le Roy: That is all.

Examiner Hyde: Mr. Segal, you had some other questions?

Recross-examination on behalf of Station- WCSH and WHA.

By Mr. Segal:

Q. Is there now available field strength measuring apparatus that will read below 1000 microvolts per meter?

A. The equipment as supplied to all of the supervisors of radio on which the official reports are made to the Commission has an accuracy down to 20 microvolts per meter and may be read even lower than that. I have personally used equipment that would go down to 1 microvolt per meter.

Q. How long ago, Mr. Ring? A. 1927.

Q. Four years ago. That is all.

Cross-examination (continued) on behalf of applicant.

By Mr. Le Roy:

Q. This exceptionally precise equipment, is that commercially available, or is that built specially for the Department? A. At that time it was equipment belonging to the research laboratory of the General Electric Company.

By Mr. Segal:

Q. It is available now? A. I understand that
143 such equipment is available at the present time,
available even below that much.

By Mr. Le Roy:

Q. When did that become available, do you know, Mr. Ring, commercially? A. No, I don't know the exact date. I can find out for you.

Examiner Hyde: Any further questions of this witness? If not, he is excused.

Counsel for WCSH, call your first witness.

Evidence on Behalf of Respondent- WCSH and WHA.

Thereupon, **William L. Foss**, produced as a witness on behalf of stations WCSH and having been first duly sworn, was examined and testified as follows:

Direct examination.

By Mr. Segal:

Q. State your name and address and occupation. A. My name is William L. Foss. I reside at 63 Payson Street, Portland, Maine; and am employed as chief engineer of Station WCSH.

Q. What has been your experience? A. From September 1912 to about December 15, 1913, I was an electrician, in the Headlight Engineering Steam Locomotive Division for the Maine Central Railroad and General Electric Company. I was working for the General Electric Company, but assigned to the Maine Central. From December
144 1913 to about June 1915 I was assistant superintendent of power stations of the Cumberland County Power and Light Company, and from June 1915 to February 1917 I was superintendent of stations for the same company. In February 1917——

Mr. Le Roy: I know Mr. Foss's qualifications previously. I can waive that.

By Mr. Segal:

Q. What is the geographical situation of Maine with reference to area and population? A. The State of Maine has approximately 300,000 square miles of territory and is inhabited by approximately 800,000 people. Many of these people live in scattered and isolated communities, separated by long distances from the nearest railroad station. These isolated communities are dependent almost exclusively upon radio service for entertainment. The women of the households in these small communities and on isolated farms are especially confined to the interior of their homes due to the extremely long and severe winters. It has been my personal experience to have visited some of these homes before the advent of radio, on which occasion a telephone call made by one neighbor would be listened to in some cases by 30 or 40 of the subscribers of the same party telephone line, this being the only method of entertainment—listening to their distant neighbors' conversation.

Q. How about the summer season? A. During the summer season the population of the State is increased materially. In many localities it is increased many fold by the tourists from those parts of the country which
145 in the winter are very well served by radio. These tourists occupy camps and cottages, as well as hotels, throughout the entire area served by WCSH, making a population greatly in excess of the published popula-

tion figures. They are accustomed to good radio service in their homes and are dependent upon station WCSH for their entire summer service. WCSH, however, maintains a complete year-round service.

The people of these sparsely settled communities have, in most cases, a very small amount of cash passing through their hands in the course of the year. They raise a large amount of the commodities they consume, and have very little to sell, and except for the local market produce very little that can be sold to bring an income. They are, however, well educated as compared with similar communities in other parts of the United States. New England prides itself upon its cultural accomplishments.

Q. How many stations are there in Maine getting service? A. There are only three stations in the entire State of Maine, one in New Hampshire. Besides WCSH, the other two Maine stations are in Bangor, 150 miles northeast of Portland. One of these stations has only 100 watts power, the other 500 watts. These stations are unable to serve but a very small part of the Maine area and do not serve Portland or the Portland area at all. The New Hampshire station is at Laconia with only 100 watts power.

Q. When was the first transmitter installed by W*SCH*?

A. The first transmitter was installed by WCSH in
146 1925 in the Congress Square Hotel Building. During the first years of its existence it was operated only a few hours each week. The programs have been gradually expanded, so that it now operates almost continuously from 8:00 a. m. until 11:15 p. m., every day in the week. The first equipment was a 500-watt Western Electric transmitter. Recently a construction permit was granted and a new 5000-watt RCA transmitter was installed in a new building located in the town of Scarboro, Maine, five miles from the city of Portland. This transmitter began operating with 1000 watts power in May 1930. The studios are located on the top floor of the Congress Square Hotel in Portland. The studios were enlarged and refinished at a considerable cost at the time of installation of the new transmitter.

Q. Who owns the station? —. WCSH is owned and operated by the Congress Square Hotel Company. With the exception of qualifying shares, Mr. H. P. Rines owns all the common stock of this company. Since he acquired the ownership of this Company in 1920——

Mr. Le Roy: Mr. Examiner, it seems to me the only point in issue here is the question of interference. It seems to me this might be cut considerably.

Mr. Segal: Well, if it is conceded that the applicant rests his case entirely upon that and makes no issue of comparative merits, and concedes that the application should not be granted if interference will result, I am perfectly willing to give this up; but if, on the other hand, it is necessary for us to meet the issue of comparative merits, if the claim is made that these people are entitled to some restoration of their service area at our expense, then, of course, for our protection, we must show what is involved from our standpoint. 147 It is merely a question of the attitude that is taken by the applicant. As I understood from the application, the allegation is that they had a larger service area that was reduced, and they now want to enlarge it and at the expense of the people on the 940 kilocycle channel.

Mr. Le Roy: I think that would probably be applicable to WFIW, but so far as the testimony has gone yet it would not be applicable here.

Mr. Segal: Mr. Ring testified we are about 320 miles under the recommended separation.

Examiner Hyde: This matter seems material, as I view it.

Mr. Le Roy: All right. I will waive my objection.

By Mr. Segal:

Q. Go forward. A. WCSH is owned and operated by the Congress Square Hotel Company. With the exception of qualifying shares Mr. H. P. Rines owns all the common stock of this company. Since he acquired the ownership of this company in 1920, the Company has not declared a dividend on its common stock, but has used its income and reserves for improvement and expansion of its property, and the making of other developments. Through a subsidiary it built, owns and operates the Carpenter Hotel in Manchester, New Hampshire. It built, owns and operates the Eastland Hotel in Portland, Maine. This hotel is built and furnished in a unique manner, especially designed for tourist accommodations in the summer and residential use in the winter, having all the services usually 148 found in modern apartment hotels with many additional services not usually provided.

During the last twelve months the Company has, in addition to having spent approximately $100,000 in improvements in the Congress Square Hotel, erected the necessary buildings and purchased and installed the new radio transmitter. The cost of this transmitter was approximately $120,000. To date the Company has expended approximately $180,000 on the radio station equipment.

The latest development of the Company has been the building of a village of 100 houses suitable for moderate priced tourist accommodations, this village being a reproduction of a medieval Danish town. The net worth of the Congress Square Hotel Company is approximately $1,600,000.

It is the policy of the Company to continue to make developments beneficial to the community it serves. WCSH has consistently maintained a policy of offering its services free of charge to worthy local enterprises and philanthropic institutions. The Maine Automobile Association and the Maine Publicity Bureau have use of the services of the station regularly for the purpose of promoting interest in better roads and greater safety of automobile driving. Numerous educational lectures and talks are given each week, as well as farm talks and weather reports prepared by the United States Department of Agriculture.

Q. How about religious services? A. The station sponsors the first radio church of America; to our knowledge
the only church of its kind in America. The minister
149 of this church gives his entire time to follow up the
letters received from the Sunday service he conducts
over this station. His church service, delivered over the radio, is especially designed for the country people of sparsely settled districts in the interior and along the coast. We feel that his influence is felt more directly and definitely than is that of ministers whose sermons are directed primarily to the audience in the churches in which they preach, and only incidentally to the radio listeners. This is evidenced by the fact that the radio pastor's services, although intended primarily for people who live in isolated areas where there are no church services, nevertheless influence a very large number of people in the area immediately adjacent to the station where there are many churches. He performs more marriage ceremonies and conducts more funerals than all of the other Portland ministers combined.

A series of concerts on the municipal organ is broadcast during the summer. This organ, given by Cyrus K. Curtis, publisher of the Ladies' Home Journal, whose boyhood home was in Portland, is the finest and one of the largest organs in the world.

The personnel of the station consists of twelve employes, exclusive of artists, the number of whom varies from time to time.

The policy of the management is to continue in the development of New England's summer tourist business, and this development must needs reflect either directly or indirectly upon economic conditions of a majority of
150 the retail and wholesale businesses of the State. It is also committed to the highest type of radio broadcasting, maintaining the policy of keeping abreast of the developments of the broadcasting art and has taken advantage of every opportunity so to do.

Q. When was the station installed? A. Station WCSH was installed under my supervision and was placed on the air for the first time June 12, 1925. A period of tests followed for one month and on the first of July of that year the station was officially opened. The station at that time was a Western Electric Type 1-B, 500 watt transmitter, with complete Western Electric speech input equipment and was kept thoroughly up to date with new and improved apparatus as fast as it was released from the laboratories.

We started operation on 256 meters, 1170 kilocycles, and used this frequency until the following November. In the meantime station WRVA in Richmond, Virginia, was placed on this frequency by the Department of Commerce and seriously heterodyned our station. This heterodyning led to a conference with Mr. Terrell and Judge Davis at which time we were invited to use any means at our disposal to find a channel on which no carrier was present. If successful we were promised this channel. The preparation for and the carrying through of this experiment started a long series of experiments which have been carried out from that time until the present and are still being carried on.

Q. You are referring now, Mr. Foss, to a series of experiments in connection with heterodyne interfer-
151 ence? A. Heterodyne interference, direction effects upon the field intensities and frequencies.

Q. What did the first apparatus that you used consist of? A. The first apparatus at the test location consisted of a Western Electric 4B, super-heterodyne receiver, a 55-E repeating coil, a 24-A speech input amplifier, an extra oscillator, a Kolster decremeter and a General Radio precision wave meter.

Q. Where were they? A. These were placed at a listening station. 16.2 miles from Portland in the town of Gray, Maine. These are no trolleys or other apparatus to interfere with reception and at this point it is ideal. This apparatus has been increased until at present it consists of the aforementioned apparatus. Field intensity apparatus and additional laboratory apparatus such as decade boxes, laboratory micro-ammeters, oscillographs, and an assortment of apparatus to make possible the measurement of signal strength, directional effects, interferences, frequencies, and so forth. The value of this apparatus at this time is approximately $10,000.

Q. Do you have apparatus there that will measure field strengths under a thousand microvolts? A. Yes, sir.

Q. How long have you had such apparatus? A. I have had apparatus that would measure under a thousand microvolts for approximately four years.

152 Q. Was it apparatus of the type that was commercially available? A. Not up until about three months ago. I have had apparatus for approximately one year that will measure down to one microvolt.

The operation of this test apparatus has been conducted very successfully throughout the years since the tests were started and has been operated not only in cooperation with but actually at the request of the Department of Commerce and the Radio Commission.

The tests showed at the time the apparatus was first installed that 10 channels were free of carriers at that time. The first results of the test were that we not only found several others for the commission which were assigned to various stations, including WEEI, WJAR, WTIC and others. Our first tests on simultaneous operations with stations which we knew to be close enough to heterodyne were made in September of 1927. The congestion then was becoming a serious problem and at the request of Mr. O. H. Cardwell, at that time commissioner from the First Zone, we ran lines to Portland from our listening station in Gray and tried simultaneously experimental tests on approximately 40 frequencies.

At this time very few stations were using crystal control and those that were had no crystal temperature control so that the drifting of frequencies was bad and the holding of stations to zero beat was practically impossible without manual operation. However, by picking up the carrier of a remote station, amplifying this carrier and operating the transmitter at zero beat to it we found
153 that the modulation of the two stations, carrying different programs, was an unwholesome jumble and that most of the experiments ruined the quality of our own signal at this point 16 miles from Portland.

It was also necessary to keep one man continually at the controls to hold anything like zero beat. I have prepared a composite map showing two facts which closely coincide. First, the shaded area——

Mr. Segal: I introduce that map in evidence.

(Two copies of field test map were received in evidence, marked "Docket No. 1152, WCSH Exhibit 1," and are on file with transcript of the record with the Commission.)

By Mr. Segal:

Q. Go ahead. A. First, the shaded area shows the territory from which carriers can be detected at the listening post mentioned, and, second, it coincides with the mail received over the period from 1925 to April of 1930 when our new transmitter was placed in operation. At the test location we have received the carrier of every station in the shaded area having a power of 500 watts or more.

We have made test measurements of field intensity showing that at night the signal la*ye*d down by Station PWX in Cuba ran from 12 to 16 microvolts per meter.

Q. How about the Great Lakes region in which this transmitter is located? A. The tests of the stations in the Great Lakes region were started in the fall of 1927
154 and have been kept up continuously since that date. The latest tests made in checking the intensity of carriers from the Great Lakes region were started on Friday, January 30th. There have been some since then, but I have not been home to check them.

Q. All right. A. And running through to the morning of Saturday, the 31st. At 11:25 p. m., January 30th, WGR in Buffalo came through with a signal intensity of approximately 40 microvolts per meter. At 11:59 p. m., KYW laid down an intensity of 30 microvolts per meter, and at 11:37 p. m. WTMJ also laid down the same intensity. This station has been operating simultaneously with WLBZ in Bangor over an extended perios, and has utterly ruined the broadcasts from Station WLBZ since the two stations were placed on this channel.

WLBZ is located 153 miles from Portland and is the only other station in Maine which attempts to give consistent service to the people of Maine. The same condition exists with WNAC of Boston, Massachusetts, operating on 1230 kilocycles, which station has on its frequency WFBM in Indianapolis, Indiana, and WSBT at South Bend, Indiana. These two stations, sharing time, lay down terrific interference on WNAC and completely spoil WNAC's evening reception throughout the State of Maine. If the Bay City station were placed on 940 kilocycles, exactly the same condition would exist regarding the Portland station and this would, of course, mean that Maine would have no service from any station within its own borders.

Measurements were also taken on other stations in and near Chicago showing them to come through with
155 signals nearly as strong. These signals are of no service within the territory to the listeners as they are capricious and in most cases are totally sky wave.

Tests have also been made to determine the ratio of signal strength which must exist for the stronger station not to be affected by the heterodyne interference of the weaker. It is my opinion, arrived at as a result of these tests, that a station can render satisfactory service if the ratio of the signals is not less than 200 to 1. In outlying districts where the average listener thinks that a signal of 500 microvolts is fine service this ratio should be maintained. From two surveys made during 1929 and 1930 I have definitely established the fact that 500 microvolts in the area around Portland is considered an excellent signal.

The new transmitter which we placed in operation in May 1930 is the latest and best apparatus which we could obtain. This apparatus was purchased from the Radio

Corporation of America and consists of a 5-kilowatt transmitter, Type 1005-B, with RCA speech input equipment and duplicate channels and amplifiers throughout. The studios have been remodeled and equipped with the latest condenser microphones, and the transmitter placed approximately five miles from Portland, in a field in Scarboro purchased for that purpose. The towers are Milliken design, 300 feet high, spaced 600 feet apart, and the antenna is a true quarter-wave antenna. The cost of this transmitter is approximately $180,000 and the work on the antenna alone has cost nearly $1500. This item means labor only and does not include a single part of the apparatus
156 or material. We have endeavored in the design and installation of this transmitter to give the people of Maine and New Hampshire the best and most consistent radio service possible, and have spared no expense in making complete installation as efficient as the present state of the art permits.

I have previously stated that the people in this territory, never having had better radio reception, are highly pleased with a signal of 500 microvolts. Recently I spent several days in Northern Maine, 160 miles from WCSH, where the signal laid down by the station was only 16.8 microvolts per meter. This signal seemed to satisfy the people of that district. It can readily be seen that a station laying down a signal of 30 microvolts could make the signal at this point, 16.8 microvolts, wholly impossible to listen to, and it would seriously interfere with a signal of less than 3300 microvolts per meter.

WBCM is now separated from WCSH by a distance of 680 miles, approximately 200 miles of which is over water. Water having a very low attenuation factor, we can safely say that the land separation of the two stations is 480 miles, or the difference between the physical separation and the 200 miles of water over which the waves pass. This distance is far too small to be used in separating two stations of over 500 watts.

During the summer of 1930, directly following the installation of the new transmitter at Portland, a thorough survey of the territory served by this station was started. This survey is now complete and maps prepared showing the results obtained.

157 Q. That is Exhibit 2? A. Yes, sir.

Mr. Segal: I offer that in evidence.

(Two copies of population and field strength maps were received in evidence, marked "Docket 1152, WCSH Exhibit 2," and are on file with transcript of record with the Commission.)

The Witness: I have prepared this map showing the counties and their population so that a close approximation can be made of the people residing in the area served.

A table of population affected by signal strengths of 100 microvolts per meter, 500 microvolts per meter and 2000 microvolts per meter follows.

Mr. Segal: May those population tables be just reproduced in extenso without reading them?

Examiner Hyde: Very well.

(The population tables referred to appear in the words and figures following:)

Population Served with 100 *Microvolts Per Meter or More.*

York County, Maine	72,934
Cumberland County	134,645
Androscoggin County	71,214
Sagadahoc County	16,927
Lincoln County	15,498
Knox County	27,693
½ Oxford County	20,742
Kennebec County	70,691
Waldo County	20,286
½ Hancock County	15,360
158 ½ Barnstable County, Mass.	16,152
¼ Essex County, Mass.	124,510
½ Rockingham County, N. H.	26,875
Strafford County, N. H.	38,850
½ Carroll County, N. H.	3,569
Total	675,926

Population Served with 500 *Microvolts per Meter or More.*

York County, Maine	72,934
Cumberland County	134,645
½ Androscoggin County	35,607
Sagadahoc County	16,927
½ Lincoln County	7,749
¼ Knox County	13,846
Total	281,708

Population Served with 2,000 *Microvolts per Meter or More.*

¼ York County, Maine	18,233
½ Cumberland County	67,322
Total	85,555

By Mr. Segal:

Q. What is the total there of the population served with 100 microvolts per meter more? A. 675,926 people.

Q. And the population served with 500 microvolts or more? A. 281,708 people.

Q. And the population served by 2000 microvolts
159 per meter or over? A. 85,555.

Q. What do you conclude from those? A. It can be clearly seen that even though strictest adherence to frequency assignment be kept, interference from WBCM, operating nithttime on 940 kilocycles, would approach a value which would push back the service area of WCSH to the 2 millivolt line and decrease the service now rendered 675,926 people to a local service only, reduced to approximately 85,555 people.

In the case of Bay City separation from WFIW at Hopkinsville, Kentucky, also operating on this frequency, we find a distance of 515 miles over land with an attenuation factor which is admittedly as low as any attenuation factor in the country, namely, north and south in the central plain states. Its separation from WDAY, Fargo, North Dakota, is only 690 miles, about 60 miles of which is over water, making this separation far too small for good, consistent night operation.

During September of 1930 we made a complete survey of radio conditions in the State of New Hampshire, checking very carefully the service rendered by ourselves and particularly the Massachusetts stations that served this territory. At that time no readings could be taken on WLEX at Lexington, one of the reasons being that this station was terrifically heterodyned, its signals being objectionable and therefore useless. This condition existed in Nashua and Manchester, New Hampshire, Nashua being only about 30 miles from Lexington. Since this condition existed nightly and the same condition now exists nightly in Manchester, it indicates that WBCM, the applicant in this case, is interfering greatly with the Lexington
160 station upon its present frequency and reducing its service area to a very few miles.

Since this has become an established fact by tests, it follows that without any doubt this station transmitting on the same frequency with WCSH and separated by only 680 miles will produce terrific interference within 10 miles of the transmitter, which we have taken so much time and money to construct.

Another very important factor is that more than 500,000 people of northern Maine do not receive a signal more than 100 microvolts per meter from any station, and an interfering signal of 30 microvolts to these people renders one of the very few channels which are of service to them at present absolutely useless.

The policy of this station has been one of the closest cooperation with the Commission in all its problems since the Commission came into existence, and previous to that time the same policy was followed out with the Department of Commerce. The management of WCSH has cooperated at all times when real problems were presented to it by the Commission.

I might state here also other stations. We do a lot of work for other stations.

After approximately five years of continuous cooperation we have solved this problem. My conclusion is that a great injustice would be done the people of Maine and New Hampshire if WBCM were permitted to operate simultaneously with WCSH on 940 kilocycles with 500 watts day and night, and to deprive them of the service they
161 they are now receiving from WCSH.

Mr. Segal: You may cross-examine.

Examiner Hyde: Counsel for the applicant may cross-examine the witness.

Cross-examination on behalf of the applicant.

By Mr. Le Roy:

Q. What is the present service area, Mr. Foss, of this station? A. Of WCSH?

Q. Yes. A. I make no statement as to what our service area is. These lines are day and night reception at that time, lines determined from a survey that took, as the map states, a total mileage by the truck of 8,670. The total number of observations was 872.

As you know, WCSH—or as I testified—WCSH has a quarter-wave antenna. Its signal does not increase at night. We thought at first that it would be decreased at night, but we found that the reason the interference on and around the channel caused that assumption to be taken before measurements were made. It was checked in three different seasons, the changing season of the fall, during the summer itself, and during December, and the service area is a mooted question among engineers. Professor Jansky lays down A, B and C grade of reception, in which he gives certain limits.

I should say from my actual observations that in that territory 500 microvolts was about the service area; that is, that area enclosed by 500 microvolts was about 162 the area that we consistently serve. At times interference on adjacent channels and the noise level goes above that 500 microvolt level, so as to spoil reception outside of that line.

Q. What is the approximate radius of that area? A. It is an elongated area there, but between 30 and 40 miles.

Q. What is the population of that 30 miles, would you say? A. 500 microvolts?

Mr. Segal: Yes.

A. (continued.) I have given that in my testimony there. It is 281,708.

By Mr. Le Roy:

Q. In your tests have you considered the 500-watt stations in the Great Lakes area? A. Yes, I have. I have been running these tests, as I say, for several years, and I made very extensive measurements on WGR before that was increased to a thousand watts. I made very extensive tests on WSAD and WLW when WLW was 5000 and WSAD was 500. In fact, we attempted to operate simultaneously with WSAD by request of Mr. Caldwell. We kept that frequency—at that time it was 361.8 meters—for 30 days for the simple purpose of making tests for the Commission. We found it was wholly impossible to operate it at that, and we interfered with them just as bad as they did with us.

Q. Did you ever pick up WBCM in any of these tests? A. I never have, no; not that I can remember. I might find it in my files. WMBC at night has been picked up and worked.

163 Q. You mentioned the expanse of water intervening between WBCM and your station. Would that affect the ground wave or the sky wave? A. It affects the ground wave, and probably the biggest part of that interference is sky wave that is laid down over in Eastern New England by any of those stations. I know that some of those stations it is only sky wave. However, in my own survey you will notice that an elongation or pushing back of those various lines comes from various places, and in this case it is ground wave.

Q. In your opinion would the ground wave of a 500-watt station in Michigan be likely to be heard by you? A. I cannot answer that, because I am not certain of it. I don't know what the average attenuation factor is between Bay City, Michigan, and Portland.

Q. I think Mr. Ring mentioned in his testimony that the satisfactory ratio was 100 to 1. A. Yes.

Q. I think you mentioned 200 to 1. A. I still stick to 200 to 1 as long as the Commission sticks to 500 cycles in variation. When they quote 50, I am going to concede that it is 100 to 1. In fact, my calculations in this testimony are based on 100 to 1, although I state that 200 to 1 is what I think is satisfactory.

Q. What do you think would be the field strength, Mr. Foss, of a 500-watt station in Michigan coming in to your station? A. I have made so many guesses in the past and have been so dead wrong, that I am not guessing.
164 When I measure it I will know.

Q. You decline to estimate it? A. Yes, sir.

Q. Have you any programs—— A. I do, however, state that even if it were a very, very weak signal, if it were 10 microvolts, it would mean that it would come back to our 1 millivolt line; conceding that you would hold the frequency close enough so that the 100 to 1 ratio would be permissible. In other words, you would not lay down a 500-cycle note on it or 1500-cycle note on it. It would come clear back to our 1000 microvolt line.

Q. Have you any programs to put in evidence on this? A. No, but I can produce very complete programs, or Mr. Segal can for me. He can get them from our station.

Q. Do you have a chain affiliation, Mr. Foss? A. Yes, sir; Red network of the National Broadcasting Company; have been since 1926.

Q. You say you could file a program, Mr. Foss? A. Why, you can file programs, can't you (Addressing Mr. Segal)?

Mr. Segal: Yes.

The Witness: He is asking me can I file programs?

Mr. Segal: Well, answer either yes or no, whichever you want.

The Witness: Surely, we will file programs.

Mr. Le Roy: That is all, Mr. Examiner.

Mr. Segal: When does the Examiner desire that we file these programs?

Examiner Hyde: Within a reasonable time.

165 The Witness: How recent do you want, last week or a month ago or two months ago?

Mr. Le Roy: A representative program.

The Witness: Will you accept one that Mr. Segal has here in his office, or do you want last week's program?

By Mr. Le Roy:

Q. There have been no changes in your program policy during that time, I assume? A. No, not a bit.

Mr. Le Roy: That will be all right, then.

Examiner Hyde: Any further questions of this witness?

Mr. Segal: How many of these do you want? We can give you a week. Is that all right?

Mr. Le Roy: Yes.

(Two copies of week's programs of WCSH were to be furnished by Mr. Segal, to be marked "Docket 1152, WCSH Exhibits 3 and 4.")

Examiner Hyde: Any further questions of this witness?
Mr. Segal: One question.

Redirect examination on behalf of Station WCSH.

By Mr. Segal:

Q. You told Mr. Le Roy that you did not hear WBCM, that you do not recollect having heard WBCM at the testing location. Does that mean that its carrier was not coming in there? A. No, sir. I did hear a terrific heterodyne laid down by WLEX, which I assumed to be interference, in fact, made by WBCM. The component fields laid 166 down by stations on any particular frequency are as the sum of the factors. That means that two very small waves, interfering waves, at any given point, may give a terrifically large result.

Q. In other words, you concur with what Mr. Ring and Mr. Carpenter have said here already, the nuisance area of the station goes far, far beyond any place where it can be heard? A. Beyond its usable area, yes.

Mr. Segal: That is all.
Examiner Hyde: Any further questions by anyone? (No response.) The witness is excused.
Any further testimony in behalf of WCSH?
Mr. Segal: We rest.
Examiner Hyde: Mr. Fisher, do you have any further testimony?
Mr. Fisher: No.
Examiner Hyde: Mr. Sutton, do you have anything?
Mr. Sutton: Just a word.
Examiner Hyde: Mr. Le Roy, do you have any rebuttal testimony to offer?
Mr. Le Roy: No rebuttal.
Mr. Segal: I desire to call your attention to the Reading Broadcasting Company case which the Court of Appeals recently decided, in which an under quota station was applying to go on frequency, wherein the issue was of a similar nature to this one, and the court upheld the viewpoint

that you could not establish stations in under quota states at the expense of stations in other states, even though they be over quota, without proving that first there would 167 be no interference. Interference was a predominating factor in that case, and it is the predominating factor in this case.

I desire on that basis to ask for a specific finding of the Examiner that there would be interference caused in this case, and therefore it would not be in the public benefit to make the change.

Examiner Hyde: Do you have anything further, Mr. Le Roy?

Mr. Le Roy: Well, I wish to ask for a finding that there is no interference, of course; also that we think this case comes within the scope of that WTMJ case, I believe, the Milwaukee Journal case.

Examiner Hyde: I call attention of all parties to the fact that they will have an opportunity to file exceptions with the Commission to the report which the Examiner will submit.

The hearing is then concluded.

(Whereupon, at 5:55 o'clock p. m., the case was submitted and the hearing concluded.)

168 Docket No. 1152.

APPLICANT'S EXHIBIT 1.

Hart, Dice & Carlson, Official Reporters.

Apr. 24, 1931.

Introduced at Hearing Before Federal Radio Commission.

The Voice of Northeastern Michigan.

Station WBCM

Studios and Offices: Hotel Wenonah, Bay City, Michigan.

Schedule for Week of April 19th.

169 Bay City, Michigan.

S. F. Northcott, Gen. Mgr.

212.6 Meters, 1,410 Kilo. 500 Watts Min., 1,000 Watts Max.

W-B-C-M. W-B-C-M. W-B-C-M.

April 20th, Monday.

	8:00- 8:15	Morning Devotions.
	8:15- 8:30	Melody Musketeers.
	8:30- 8:45	Tony's Scrapbook.
L	8:45- 9:00	Studio Program.
	9:00- 9:30	Something for Everyone.
	9:30-10:00	U. S. Navy Band.
	10:00-10:15	Greetings.
	10:15-10:30	Harmonies and Contrasts.
L	10:30-10:45	Studio Program.
	10:45-11:00	Melody Parade.
	11:00-11:15	What I Am Trying To Do.
	11:15-11:30	The Madison Singers.
L	11:30-12:30	Classified Program.
	12:30- 1:00	Columbia Revue.
	1:00- 1:30	Don Bigelow and his Park Central Orchestra.
	1:30- 2:00	Harry Tucker and his Barclay Orchestra.
	2:00- 2:30	Columbia Artists Recital.
	2:30- 3:00	American School of the Air.
	3:00- 3:30	Columbia Salon Orchestra.
	3:30- 4:00	Ann Leaf at the Organ.
	4:00- 4:30	U. S. Army Band.
	4:30- 5:00	Wardman Park Hotel Orchestra.
	5:00- 5:15	Art Gillham.
	5:15- 5:30	Gypsy Music-Makers.
	5:30- 5:45	Lee Morse.
L	5:45- 6:00	Dance Music.
	6:00- 6:30	Semi-Annual National Conference of Business Papers Editors.
L	6:30- 6:45	Dance Music.
L	6:45- 7:00	Dance Music.
	7:00- 7:15	Current Events.
	7:15- 7:30	Winegar's Barn Orchestra.
L	7:30- 8:00	Diversified Program.

L 8:00- 8:15 Roy Baker, Tenor.
L 8:15- 8:30 Dance Music.
8:30- 9:00 Simmons Beds Program.
9:00- 9:30 Standard Brands, Inc. (Three Bakers).
L 9:30-10:30 Variety Program.
10:30-11:00 Savino Tone Pictures.
11:00-11:15 Morton Downey with Leon Belasco and his Orchestra.
11:15-11:30 Arthur Pryor's Cremo Band—American Tobacco Company.
11:30-12:00 Ben Bernie and his Orchestra from Chicago.

170 Tuesday, April 21st.

8:00- 8:15 Morning Devotions.
8:15- 8:30 Art Gillham.
8:30- 8:45 Tony's Scrapbook.
8:45- 9:00 Morning Minstrels.
9:00- 9:30 Something for Everyone.
9:30-10:00 Morning Moods.
L10:00-10:15 Studio Program.
10:15-10:30 Columbia Mixed Quartet.
10:30-10:45 O'Cedar Time.
10:45-11:00 Party House.
L11:00-11:15 Studio Program.
11:15-11:30 Your Foods and You.
L11:30-12:30 Classified Program.
12:30- 1:00 Columbia Revue.
1:00- 1:30 Don Bigelow and his Park Central Orchestra.
1:30- 2:00 Armand Vecsey and his Ritz Carlton Hotel Orchestra.
2:00- 2:15 Dale Wimbrow.
2:15- 2:30 The Four Clubmen.
2:30- 3:00 American School of the Air.
3:00- 3:15 Columbia Salon Orchestra.
3:15- 3:30 The Three Doctors.
3:30- 4:00 The Captivators.
4:00- 4:15 Garden Talk—Clarence Fowler.
4:15- 4:30 Italian Idyll.
4:30- 5:00 Columbia's Artists Recital.
5:00- 5:15 Frank Ross—Songs.
5:15- 5:30 Adventures in Words.
5:30- 5:45 Bert Lown and his Biltmore Orchestra.

	5:45- 6:00	Tony's Scrapbook.
	6:00- 6:45	Harry Tucker and his Barclay Orchestra.
L	6:45- 7:00	Dinner Music.
	7:00- 7:15	The Political Situation in Washington To-night.
L	7:15- 7:30	Dance Music.
L	7:30- 8:00	Chevrolet Chronicles Program (Chevrolet Motor Car Co.).
L	8:00- 8:15	Dance Music.
	8:15- 8:30	Old Gold Program.
L	8:30- 8:45	Francis M. Carter, Pianist.
	8:45- 9:00	Lee Morse.
L	9:00-10:30	Diversified Program.
	10:30-11:00	Paramount Hour.
	11:00-11:15	Why Newspaper Men Meet—Geo. R. Holmes.
	11:15-11:30	Arthur Pryor's Cremo Band—American Tobacco Company.
	11:30-12:00	Romanelli and his King Edward Orchestra from Toronto.

171 Wednesday, April 22nd.

	8:00- 8:15	Morning Devotions.
	8:15- 8:30	Art Gillham.
	8:30- 8:45	Tony's Scrapbook.
L	8:45- 9:00	Studio Program.
	9:00- 9:30	Something for Everyone.
	9:30-10:00	Morning Moods.
	10:00-10:15	Mirrors of Beauty.
	10:15-10:30	Melody Parade.
	10:30-10:45	The Care and Feeding of Husbands.
	10:45-11:00	Fashion Facts of 1931.
L	11:00-11:15	Studio Program.
	11:15-11:30	Ben and Helen.
L	11:30-12:30	Classified Program.
	12:30- 1:00	Columbia Revue.
	1:00- 1:30	Don Bigelow and his Park Central Orchestra.
	1:30- 2:00	Harry Tucker and his Barclay Orchestra.
	2:00- 2:30	Columbia Artists Recital.
	2:30- 3:00	American School of the Air.
	3:00- 3:15	Columbia Salon Orchestra.
	3:15- 3:30	The Three Doctors.

3:30- 4:00	Syncopated Silhouettes.
4:00- 5:00	U. S. Navy Band.
5:00- 5:30	Asbury Park Casino Orchestra.
5:30- 5:45	Lee Morse.
5:45- 6:00	Tony's Scrapbook.
6:00- 6:15	"Bill Schudt's Going to Press."
6:15- 6:30	Winegar's Barn Orchestra.
L 6:30- 7:00	Dance Music.
7:00- 7:15	Morton Downey.
7:15- 7:30	Don Bigelow and his Park Central Orchestra.
L 7:30- 9:30	Variety Program.
9:30-10:00	Arabesque.
L10:00-10:45	Diversified Program.
10:45-11:15	Columbia Concerts Corporation Program.
11:15-11:30	Arthur Pryor's Cremo Band—American Tobacco Company.
11:30-12:00	Guy Lombardo and his Royal Canadians.

172 Thursday, April 23rd.

8:00- 8:15	Morning Devotions.
8:15- 8:30	Art Gillham.
8:30- 8:45	Tony's Scrapbook.
8:45- 9:00	Morning Minstrels.
9:00- 9:30	Something for Everyone.
9:30-10:00	Morning Moods.
10:00-10:15	Chatting with Ida Bailey Allen.
10:15-10:30	Pot of Gold.
10:30-10:45	Your Garden.
L10:45-11:00	Studio Program.
11:00-11:15	Five Arts.
11:15-11:30	An Old Fashioned Garden.
L11:30-12:30	Classified Program.
12:30- 1:00	Columbia Revue.
1:00- 1:30	Don Bigelow and his Park Central Orchestra.
1:30- 2:00	Savoy-Plaza Orchestra.
2:00- 2:15	Dale Wimbrow.
2:15- 2:30	Columbia Artists Recital.
2:30- 3:00	American School of the Air.
3:00- 4:00	Fiske Jubilee Singers.
4:00- 4:30	Melody Magic.
4:30- 5:00	Asbury Park Casino Orchestra.

	5:00- 5:30	Will Osborne and his Orchestra.
	5:30- 5:45	Virginia Arnold, Pianist.
L	5:45- 6:00	Dance Music.
	6:00- 6:15	Tito Guizar.
	6:15- 6:45	Gordon Kibbler's Fulton Royal Orchestra.
L	6:45- 7:00	Dinner Music.
	7:00- 7:15	Morton Downey.
	7:15- 7:45	St. Moritz Orchestra.
L	7:45- 8:00	Paris Shop, Inc., Program.
L	8:00- 8:15	Variety Program.
	8:15- 8:30	Barbara Maurel, contralto with New World Symphony.
L	8:30- 9:00	Orpheus Trio.
L	9:00- 9:15	Dance Music.
	9:15- 9:30	Old Gold Program.
L	9:30-10:45	Diversified Program.
	10:45-11:00	Harriet Lee.
	11:00-11:15	Jack Denny and his Orchestra from Montreal.
	11:15-11:30	Arthur Pryor's Cremo Band—American Tobacco Co.
	11:30-12:00	Radio Roundup.

173 Friday, April 24th.

	8:00- 8:15	Morning Devotions.
	8:15- 8:30	The Melody Musketeers.
	8:30- 8:45	Tony's Scrapbook.
L	8:45- 9:00	Studio Program.
	9:00- 9:30	Something for Everyone.
	9:30-10:00	Morning Moods.
L	10:00-11:30	Studio Program.
L	11:30-12:30	Classified Program.
	12:30- 1:00	Columbia Revue.
	1:00- 1:30	Don Bigelow and his Park Central Orchestra.
	1:30- 2:00	Harry Tucker and his Hotel Barclay Orchestra.
	2:00- 2:30	Columbia Artists Recital.
	2:30- 3:00	American School of the Air.
	3:00- 3:45	U. S. Marine Band Orchestra.
	3:45- 4:00	Columbia Educational Features.
	4:00- 4:45	Curtis Institute of Music.
	4:45- 5:00	National Child Health Series.

5:00- 5:30 Light Opera Gems.
5:30- 5:45 Speech by H. F. Krafft—"Admiral Farragut."
5:45- 6:00 Tony's Scrapbook.
6:00- 6:30 Winegar's Barn Orchestra.
L 6:30- 6:45 Berry Brothers Program.
L 6:45- 7:00 Dinner Music.
7:00- 7:15 Morton Downey.
L 7:15- 7:30 Dance Music.
7:30- 8:00 Jacques Renard and his Orchestra from Boston.
L 8:00- 8:15 Catherine Coulliard, Soprano.
L 8:15- 9:00 Diversified Program.
L 9:00-10:00 M and B Old Time Dance.
L10:00-11:00 Variety Program.
11:00-11:15 Fletcher Henderson and his Orchestra.
11:15-11:30 Arthur Pryor's Cremo Band—American Tobacco Company.
11:30-12:00 Ben Bernie and his Orchestra from Chicago.

174 Saturday, April 25th.

8:00- 8:15 Morning Devotions.
8:15- 8:30 The Melody Musketeers.
8:30- 8:45 Tony's Scrapbook.
8:45- 9:00 Morning Musicale.
9:00- 9:30 Something for Everyone.
9:30-10:00 Morning Moods.
10:00-10:30 Columbia Male Trio with Virginia Arnold, Pianist.
10:30-11:00 New World Salon Orchestra.
11:00-11:30 Adventures of Helen and Mary.
L11:30-12:30 Classified Program.
12:30- 1:00 Paul Tremaine and his Yoeng's Rest-urant Orchestra.
1:00- 1:30 Don Bigelow and his Park Central Orchestra.
1:30- 2:00 Savoy-Plaza Orchestra.
2:00- 2:15 Dale Wimbrow.
2:15- 2:30 Columbia Artists Recital.
2:30- 3:00 Columbia Salon Orchestra.
3:00- 3:30 The Four Clubmen.
3:30- 4:00 Saturday Syncopaters.

	4:00- 4:30	Ann Leaf at the Organ.
	4:30- 5:00	Spanish Serenade.
	5:00- 5:45	Leon Belasco and his Orchestra.
	5:45- 6:00	Tony's Scrapbook.
	6:00- 6:30	Ted Husing's Sportslants.
	6:30- 6:45	Paul Tremaine and his Yoeng's Rest-urant Orchestra.
L	6:45- 7:00	Dinner Music.
	7:00- 7:15	Morton Downey.
	7:15- 8:00	Armand Vecsey and his Ritz Carlton Orchestra.
L	8:00- 8:15	Dance Music.
	8:15- 8:30	Ben Alley, tenor with Ann Leaf at the Organ.
L	8:30- 8:45	Diversified Program.
	8:45- 9:00	Mary Charles.
L	9:00- 9:30	Dance Music from The Armory.
	9:30-10:00	National Radio Forum from Washington.
	10:00-11:00	Hank Simmon's Show Boat.
	11:00-11:15	Jack Denny and his Orchestra from Montreal.
	11:15-11:30	Arthur Pryor's Cremo Band—American Tobacco Company.
	11:30-12:00	Guy Lombardo and his Royal Canadians.

175 Sunday, April 26th.

	8:00- 9:00	Morning Musicale.
	9:00- 9:15	Tony's Scrapbook.
	9:15- 9:50	Land O'Make Believe.
	9:50-10:00	Columbia's Commentator.
L	10:00-10:30	Sacred Music.
L	10:30-10:45	International Watch Tower Association.
L	10:45-11:00	Studio Program.
L	11:00-12:00	Immanuel Lutheran Church English Services.
	12:00-12:30	Jewish Art Program.
	12:30-12:45	International Broadcast.
	12:45- 1:15	H. M. Canadian Gre*an*diers Guards Band of Montreal.
L	1:15- 1:30	Studio Program.
	1:30- 2:00	Gypsy Trail.
	2:00- 2:30	Ann Leaf at the Organ.

2:30- 3:00	Ballad Hour.
3:00- 4:00	Symphonic Hour.
4:00- 5:00	Cathedral Hour.

176 DISTRICT OF COLUMBIA, *ss:*

Ralph Carpenter, being duly sworn deposes and says that he is the Chief Engineer of Station WBCM, of Bay City, Michigan, and authorized to represent said Station at the hearing scheduled on the pending application of James E. Davidson for transfer from the 1410 kilocycle channel to the 940 kilocycle channel. That the attached schedule of programs for the week of April 19th is a full, true and accurate schedule of such programs and is fairly representative of the programs broadcast by this Station.

RALPH H. CARPENTER.

Sworn and subscribed to before me this 23rd day of April, 1931.

[Seal of C. Ell Wills, Notary Public, District of Columbia.]

C. ELL WILLS,
Notary Public.

(Here follow Applicant's Exhibits 2 and 3, side folios 177 and 178.)

179 Docket No. 1152.

APPLICANT'S EXHIBIT 4.

Hart, Dice & Carlson, Official Reporters.

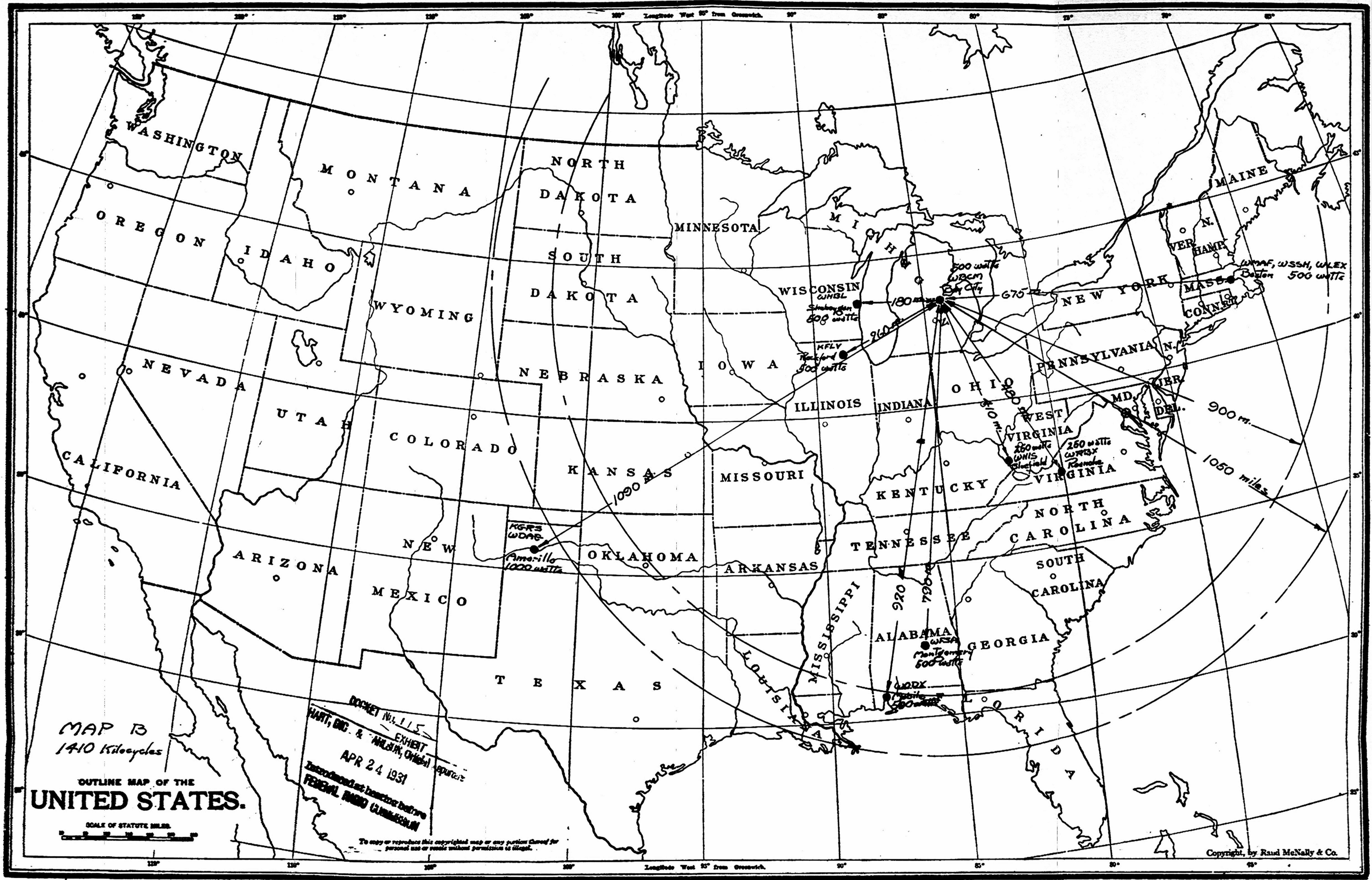
Apr. 24, 1931.

Introduced at Hearing Before Federal Radio Commission.

Survey of Interference on 940 *Kilocycles.*

180 Sanilac, Michigan. 940 Kilocycles. April 6, 1931.

5:00 P. M.	No carriers audible between WWJ, Detroit, on 920 kilocycles and CFRB, Toronto, Ontario, on 960 kilocycles.
5:15 P. M.	Same as 5:00 P. M.
5:30 P. M.	Same as 5:00 P. M.
5:45 P. M.	Same as 5:00 P. M.
6:00 P. M.	Same as 5:00 P. M.
6:15 P. M.	Same as 5:00 P. M.

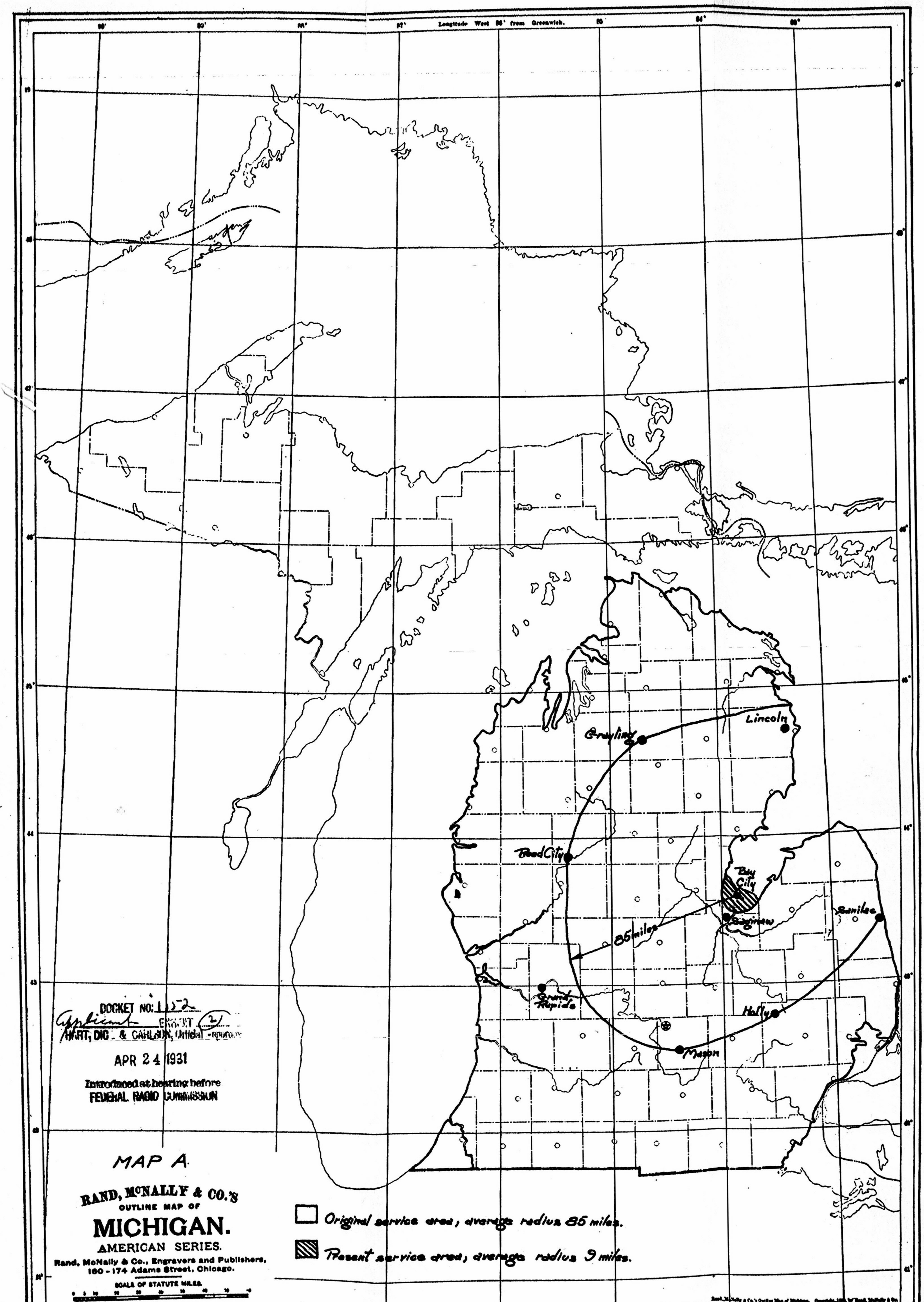


MAP B
1410 Kilocycles

OUTLINE MAP OF THE
UNITED STATES.

DOCKET No. 115
EXHIBIT
HART, BIG. & ANLSUR, Official Reporters
APR 24 1931
Introduced at hearing before
FEDERAL RADIO COMMISSION

No. 5528
James E. Danson (WBCM) Appellant,
vs.
The Federal Radio Commission et al.


Longitude West 86° from Greenwich.
Grayling
Lincoln
Reed City
Bay City
Saginaw
Sanilac
85 miles
Grand Rapids
Holly
Mason
Rand, McNally & Co.'s Outline Map of Michigan. Copyright, by Rand, McNally & Co.
SCALE OF STATUTE MILES.

DOCKET NO: 1152

Applicant EXHIBIT (2)

HART, DIG . & CARLSON, Official Reporters

APR 24 1931

Introduced at hearing before
FEDERAL RADIO COMMISSION

MAP A.

RAND, McNALLY & CO.'S
OUTLINE MAP OF
MICHIGAN.
AMERICAN SERIES.
Rand, McNally & Co., Engravers and Publishers,
160 - 174 Adams Street, Chicago.

☐ Original service area, average radius 85 miles.

▨ Present service area, average radius 9 miles.

No. 5528
James E. Dawson (WBCM) appellant;

6:30 P. M.	Same as 5:00 P. M.
6:45 P. M.	Same as 5:00 P. M.
7:00 P. M.	Same as 5:00 P. M.
7:15 P. M.	Same as 5:00 P. M.
7:30 P. M.	Same as 5:00 P. M.
7:45 P. M.	Same as 5:00 P. M.
8:00 P. M.	WFIW's carrier detected on the Western Electric 4-D receiver. No program audible on 940 kilocycles with Philco receiver.
8:15 P. M.	Same as 8:00 P. M.
8:30 P. M.	Same as 8:00 P. M.
8:45 P. M.	Same as 8:00 P. M.
9:00 P. M.	Same as 8:00 P. M.
9:15 P. M.	Another carrier beating with WFIW's carrier, producing a fifty cycle beat note. Unable to hear fifty cycle beat note on Philco broadcast receiver.
9:30 P. M.	Same as 9:15 P. M.
9:45 P. M.	Same as 9:15 P. M.
10:00 P. M.	Same as 9:15 P. M.
10:15 P. M.	Same *of* 9:15 P. M.
10:30 P. M.	Same as 9:15 P. M.
10:45 P. M.	Same as 9:15 P. M.
11:00 P. M.	Same as 9:15 P. M.
11:15 P. M.	Same as 9:15 P. M.
11:30 P. M.	Same as 9:15 P. M.

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11:45 P. M.	Same as 9:15 P. M.
12:00 Midnight	Same as 9:15 P. M.

Comments.

No carriers were heard on 940 kilocycles until 8:00 P. M., at which time WFIW's carrier was picked up on the Western Electric 4-D receiver. WFIW's program could not be heard on a Philco broadcast receiver.

At 9:15 P. M., another carrier of undetermined origin beat with WFIW's carrier, the difference being about fifty cycles. The fifty cycle heterodyne could not be heard on a Philco broadcast receiver. The two carriers remained the same intensity from 9:15 P. M. until midnight, when observations were discontinued.

No carriers could be identified on 930 kilocycles, although a faint heterodyne was noticeable on the Western Electric 4-D receiver.

WRC's carrier was heard on 950 kilocycles at 8:45 P. M., but KMBC's carrier beat with WRC's later, and made both programs unintelligible. The difference between the two carriers was approximately thirty cycles.

182 Holly, Michigan. 940 Kilocycles. April 7, 1931.

6:00 P. M. No carrier audible on 940 kilocycles.
6:15 P. M. Same as 6:00 P. M.
6:30 P. M. Same as 6:00 P. M.
6:45 P. M. Same as 6:00 P. M.
7:00 P. M. Same as 6:00 P. M.
7:15 P. M. Same as 6:00 P. M.
7:30 P. M. Same as 6:00 P. M.
WRC and KMBC heterodyning on 950 kilocycles. Difference between carriers approximately thirty cycles. Audibility very low.
7:45 P. M. WFIW's carrier detected with the Western Electric 4-D receiver. Program not audible on Philco broadcast receiver. No heterodyne interference noticed.
8:00 P. M. Same as 7:45 P. M.
8:15 P. M. WFIW's carrier faded out completely. No other carrier heard on 940 kilocycles.
KMBC much louder than WRC on 950 kilocycles.
Heterodyne interference on 930 kilocycles, but unable to identify any of the stations.
8:30 P. M. No carrier identified, but high pitched heterodyne noticed.
Audibility extremely low.
8:45 P. M. Same as 8:30 P. M.
9:00 P. M. Same as 8:30 P. M.
9:15 P. M. Same as 8:30 P. M.
9:30 P. M. Same as 8:30 P. M.
9:45 P. M. WFIW's carrier identified on Western Electric 4-D receiver.
Program below audibility on Philco broadcast receiver.

10:00 P. M. WFIW's carrier faded out. Faint high pitched heterodyne noticed with Western Electric Receiver. Heterodyne below audibility on Philco broadcast receiver.
10:15 P. M. Same as 10:00 P. M.
10:30 P. M. Same as 10:00 P. M.
10:45 P. M. WFIW's carrier detected with Western Electric 4-D receiver, but program below audibility on Philco broadcast receiver.

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11:00 P. M. WFIW's carrier faded out again. Faint high pitched heterodyne detected on Western Electric 4-D receiver. Heterodyne not audible on Philco broadcast receiver.
11:15 P. M. Same as 11:00 P. M.
11:30 P. M. Same as 11:00 P. M.
11:45 P. M. Same as 11:00 P. M.
12:00 Midnite Same as 11:00 P. M.

Comments.

WFIW's carrier was detected at three different times during the evening on the Western Electric receiver, however, the program was always below audibility on the Philco broadcast receiver. During the remainder of the evening, an extremely weak, high pitched heterodyne was detected with the Western Electric 4-D receiver. The heterodyne was also inaudible on the Philco broadcast receiver.

184 Mason, Michigan. 940 Kilocycles. April 8, 1931.

6:00 P. M. No carriers audible on 940 kilocycles.
6:15 P. M. Same as 6:00 P. M.
6:30 P. M. Same as 6:00 P. M.
6:45 P. M. Same as 6:00 P. M.
7:00 P. M. Same as 6:00 P. M.
7:15 P. M. Same as 6:00 P. M.
High pitched heterodyne between WWJ, on 920 kilocycles and CJGC, on 910 kilocycles.
7:30 P. M. Same as 6:00 P. M.
7:45 P. M. Same as 6:00 P. M.

8:00 P. M. Two carriers detected on 940 kilocycles with the Western Electric 4-D receiver. Frequency difference approximately fifty cycles. Fifty cycle heterodyne not audible on Philco broadcast receiver.

8:15 P. M. Two carriers logged at 8:00 P. M. have faded below audibility on Western Electric 4-D receiver.

8:30 P. M. Carriers logged at 8:00 P. M. detected again with the Western Electric 4-D. The more prominent carrier is WFIW. Other carrier not identified. Difference in carriers still fifty cycles. Neither fifty cycle heterodyne nor WFIW's program audible on Philco broadcast receiver.

8:45 P. M. Same as 8:30 P. M.

9:00 P. M. Both carriers same intensity. No program audible with Western Electric 4-D receiver. Neither fifty cycle heterodyne nor program audible on Philco broadcast receiver.

9:15 P. M. Same as 9:00 P. M.

9:30 P. M. Same as 9:00 P. M.

9:45 P. M. Same as 9:00 P. M.

10:00 P. M. Same as 9:00 P. M.

10:15 P. M. Same as 9:00 P. M.

10:30 P. M. Same as 9:00 P. M.

10:45 P. M. Same as 9:00 P. M.

11:00 P. M. Same as 9:00 P. M.

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11:15 P. M. Same as 9:00 P. M.

11:30 P. M. Same as 9:00 P. M.

11:45 P. M. Same as 9:00 P. M.

12:00 Midnite Same as 9:00 P. M.

Comments.

No carriers were heard on 940 kilocycles until 8:00 P. M. At 8:00 P. M., two carriers of almost equal intensity were detected with the Western Electric 4-D receiver. The difference in the carrier frequencies was approximately fifty cycles, and remained constant all evening.

Two times during the evening, at 8:30 P. M. and 8:45 P. M., one carrier became more prominent than the other and was identified as WFIW. During the remainder of the evening the two carriers were approximately the same intensity.

At no time during the evening could the fifty cycle heterodyne on 940 kilocycles be heard on the Philco broadcast receiver.

186 Grand Rapids, Michigan. 940 kilocycles. April 9, 1931.

Listening test for WHA, Madison, Wisconsin, operating on 940 kilocycles daytime only.

WHA's Operating Schedule for Thursday, April 9, 1931.

10:00 to 11:00 A. M. Central Standard Time.
12:00 noon to 1:30 P. M. Central Standard Time.

Observations were made with the Western Electric 4-D receiver from 1:00 to 1:30 P. M. Central Standard Time. No carrier was detected on 940 kilocycles during this period.

187 Reed City, Michigan. 940 Kilocycles. April 9, 1931.

7:00 P. M. No carriers audible on 940 kilocycles.
7:15 P. M. Same as 7:00 P. M.
7:30 P. M. Same as 7:00 P. M.
7:45 P. M. Same as 7:00 P. M.
8:00 P. M. Two carriers detected with Western Electric 4-D receiver, but intensity extremely low. Difference in carrier frequencies was approximately fifty cycles. The fifty cycle heterodyne was not audible on the Philco broadcast receiver.
8:15 P. M. Same as 8:00 P. M.
8:30 P. M. One carrier identified as WFIW. Audibility very low on Western Electric 4-D receiver.
8:45 P. M. WFIW's carrier intensity decreased to same value logged at 8:00 P. M.
9:00 P. M. Other carrier identified as WDAY. Intensity extremely low. Unable to hear either station or fifty cycle heterodyne on the Philco broadcast receiver.

9:15 P. M. WDAY faded to same intensity as logged at 8:00 P. M. Only fifty cycle heterodyne detected on Western Electric 4-D receiver.
9:30 P. M. Fifty cycle heterodyne faded out almost completely.
9:45 P. M. WFIW's carrier intensity increased slightly. Program not audible on the Philco broadcast receiver.
10:00 P. M. Both carriers same intensity. Below audibility on the Philco broadcast receiver.
10:15 P. M. Same as 10:00 P. M.
10:30 P. M. WFIW's carrier identified again. Intensity very low. Program not audible on Philco broadcast receiver.
10:45 P. M. Both carriers same intensity. Fifty cycle heterodyne not audible on Philco broadcast receiver.
11:00 P. M. Same as 10:45 P. M.
11:15 P. M. Same as 10:45 P. M.
11:30 P. M. Same as 10:45 P. M.
11:45 P. M. Same as 10:45 P. M.
12:00 Midnite. Same as 10:45 P. M.

188 Comments.

Two carriers on 940 kilocycles were identified, but the intensity was very low. The fifty cycle heterodyne that was heard most of the evening was of such a low intensity that it could not be heard on the Philco broadcast receiver.

WDAY's carrier was identified at 9:00 P. M., the first time during the evening.

189 Grayling, Michigan. 940 Kilocycles. April 10, 1931.

6:00 P. M. No carriers audible on 940 kilocycles.
6:15 P. M. Same as 6:00 P. M.
6:30 P. M. Same as 6:00 P. M.
6:45 P. M. Same as 6:00 P. M.
7:00 P. M. Same as 6:00 P. M.
7:15 P. M. Same as 6:00 P. M.
7:30 P. M. Same as 6:00 P. M.
7:45 P. M. WFIW's carrier identified with the Western Electric 4-D receiver. Intensity extremely low. Not audible on Philco broadcast receiver.

8:00 P. M.	Another carrier heterodyning with WFIW's carrier. Difference between carriers about ten cycles. The ten cycle heterodyne not audible on the Philco broadcast receiver.
8:15 P. M.	Same as 8:00 P. M.
8:30 P. M.	Same as 8:00 P. M.
8:45 P. M.	Same as 8:00 P. M.
9:00 P. M.	Same as 8:00 P. M.
9:15 P. M.	Same as 8:00 P. M.
9:30 P. M.	Same as 8:00 P. M.
9:45 P. M.	Same as 8:00 P. M.
10:00 P. M.	Same as 8:00 P. M.
10:15 P. M.	Same as 8:00 P. M.
10:30 P. M.	Same as 8:00 P. M. WDBJ, on 930 kilocycles, logged.
10:45 P. M.	Unidentified carrier faded out. WFIW's carrier same intensity as logged at 8:00 P. M.
11:00 P. M.	Two carriers same intensity again. Difference about ten cycles. Intensity same as 8:00 P. M.
11:15 P. M.	Same as 8:00 P. M.
11:30 P. M.	Same as 8:00 P. M.
11:45 P. M.	Same as 8:00 P. M.

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12:00 Midnight. Same as 8:00 P. M.

Comments.

A carrier was heard on 940 kilocycles at 7:45 P. M. with the Western Electric 4-D receiver. At 8:00 P. M., another carrier beat with the first, which was later identified as WFIW, producing a ten cycle heterodyne. This ten cycle heterodyne could not be heard on the Philco broadcast receiver, although reception on other stations was exceptionally good all evening.

The unidentified carrier heterodyning with WFIW, faded below audibility on the Western Electric receiver at 10:45 P. M., but was constant during the remainder of the evening.

191 Lincoln, Michigan. 940 Kilocycles. April 11, 1931.

6:00 P. M.	No carriers audible on 940 kilocycles.
6:15 P. M.	Same as 6:00 P. M.
6:30 P. M.	Same as 6:00 P. M.

6:45 P. M. Same as 6:00 P. M.
7:00 P. M. Same as 6:00 P. M.
7:15 P. M. Same as 6:00 P. M.
7:30 P. M. Two carriers detected on 940 kilocycles with Western Electric 4-D receiver, but unable to identify either. Difference between carrier frequencies about fifty cycles.
7:45 P. M. Same as 7:30 P. M.
8:00 P. M. Same as 7:30 P. M.
8:15 P. M. Same as 7:30 P. M.
8:30 P. M. Same as 7:30 P. M.
8:45 P. M. Same as 7:30 P. M.
9:00 P. M. Same as 7:30 P. M.
9:15 P. M. Same as 7:30 P. M.
9:30 P. M. Same as 7:30 P. M.
9:45 P. M. Same as 7:30 P. M.
10:00 P. M. Same as 7:30 P. M.
10:15 P. M. Same as 7:30 P. M.
10:30 P. M. One carrier identified as WFIW. Program below audibility on Philco broadcast receiver.
10:45 P. M. Two carriers same intensity again. Same as logged at 7:30 P. M.
11:00 P. M. Same as 7:30 P. M.
11:15 P. M. Same as 7:30 P. M.
11:30 P. M. Same as 7:30 P. M.
11:45 P. M. Same as 7:30 P. M.
12:00 Midnite. Same as 7:30 P. M.

192 Comments.

The usual two carriers were heard on 940 kilocycles with the Western Electric 4-D receiver, from 7:30 P. M. until midnight. Once, at 10:30 P. M., one carrier was indentified as WFIW. Audibility of low frequency heterodyne very low all evening. The low frequency heterodyne could not be detected on the Philco broadcast receiver.

RALPH H. CARPENTER.

193 Docket No. 1152.

Applicant Exhibit Five.

Hart, Dice & Carlson, Official Reporters.

Apr. 24, 1931.

Introduced at Hearing Before Federal Radio Commission.

Survey of Interference on 1,410 *Kilocycles.*

194 Sanilac, Michigan. 1,410 Kilocycles. April 6, 1931.

3:00 P. M.	WBCM coming in with very good audibility and no interference. WJR loudest station. WXYZ six d. b. lower than WJR. WBCM six d. b. lower than WXYZ. WWJ six d. b. lower than WBCM.
4:00 P. M.	No heterodyne interference noticed. WHK fifteen d. b. lower than WBCM. WJBK fifteen d. b. lower than WBCM.
4:15 P. M.	Very faint 10,000 cycle heterodyne noticed on WBCM's carrier. Heterodyne caused by station operating on next higher frequency channel—probably WMBC, Detroit.
4:30 P. M.	Heterodyne interference same intensity as 4:15 P. M. WBCM three d. b. higher than WXYZ.
4:45 P. M.	Same as 4:30 P. M.
5:00 P. M.	Heterodyne intensity increased considerably. WBCM and WXYZ same intensity, but audio frequency distortion very noticeable on WXYZ. WBCM three d. b. higher than WWJ.
5:15 P. M.	Same as 5:00 P. M.
5:30 P. M.	WBCM's audibility decreased six d. b., and heterodyne interference much stronger. CJGC, London, Ontario, about twelve d. b. above WBCM, and completely covering WWJ, Detroit. Loud generator hum noticed on CJGC's carrier.
5:45 P. M.	WBCM's audibility same as 5:30 P. M. Heterodyne interference becoming rapidly worse.

6:00 P. M.	Heterodyne ½ intensity of program. Audibility same as 5:30 P. M.
6:15 P. M.	Heterodyne interference ¾ intensity of program. Heterodyne definitely ascertained as being caused by WMBC, Detroit, operating on 1420 kilocycles. 195
6:30 P. M.	Heterodyne interference same intensity as program.
6:45 P. M.	Heterodyne interference of a complex nature, entirely covering program.
7:00 P. M.	Complex heterodyne interference completely covering program. Unable to determine stations other than WMBC, causing the interference.
7:15 P. M.	Same as 7:00 P. M.
7:30 P. M.	Same as 7:00 P. M.
7:45 P. M.	Same as 7:00 P. M.
8:00 P. M.	Same as 7:00 P. M.
8:15 P. M.	Same as 7:00 P. M.
8:30 P. M.	Same as 7:00 P. M.
8:45 P. M.	Same as 7:00 P. M.
9:00 P. M.	Same as 7:00 P. M.
9:15 P. M.	Same as 7:00 P. M.
9:30 P. M.	Same as 7:00 P. M.
9:45 P. M.	Same as 7:00 P. M.
10:00 P. M.	Same as 7:00 P. M.
10:15 P. M.	Same as 7:00 P. M.
10:30 P. M.	Same as 7:00 P. M.
10:45 P. M.	Same as 7:00 P. M.
11:00 P. M.	Same as 7:00 P. M.
11:15 P. M.	Same as 7:00 P. M.
11:30 P. M.	Same as 7:00 P. M.
12:00 Midnite.	Same as 7:00 P. M.

Comments.

WBCM's Audibility was very good during the daytime hours, until 4:15 P. M. At 4:15 P. M., WMBC's carrier beat with WBCM'S carrier, producing a high pitched tone
196 that was logged until 6:45 P. M. From 5:00 P. M.
until 6:45 P. M., the heterodyne caused by WMBC was so strong that it was impossible to listen to WBCM's program with any degree of enjoyment.

The heterodyne interference logged between 6:45 P. M. and midnight was very complex because of the great number of carriers beating against each other. It was impossible to identify any station between WHK, on 1390 kilocycles, and WJVS, on 1450 kilocycles, during the period between 6:45 P. M. and midnight.

Heterodyne interference was noticed on WWJ from 5:30 P. M. until midnight.

Het-rodyne interference noticed on WXYZ from 8:00 P. M. until midnight.

197 Holly, Michigan. 1,410 Kilocycles. April 7, 1931.

4:00 P. M.	WBCM's audibility very good, and no heterodyne interference noticed. WBCM and WXYZ same intensity. WWJ three d. b. higher than WBCM.
4:15 P. M.	Same as 4:00 P. M.
4:30 P. M.	Same as 4:00 P. M.
4:45 P. M.	Same as 4:00 P. M.
5:00 P. M.	Same as 4:00 P. M.
5:15 P. M.	Same as 4:00 P. M.
5:30 P. M.	Same as 4:00 P. M.
5:45 P. M.	Same as 4:00 P. M.
6:00 P. M.	Slight heterodyne interference noticed on 1410 kilocycles.
6:15 P. M.	Heterodyne interference slightly stronger. Caused by WMBC, Detroit, operating on 1420 kilocycles. Program audibility still good.
6:30 P. M.	Heterodyne interference ½ intensity of program. WFDF, on 1310 Kilocycles coming in very loud, slightly louder than WJR. Heterodyne notice- in background.
6:45 P. M.	Heterodyne interference stronger, but program still audible. WRBX, Roanoke, Va., operating on 1410 kilocycles, was heard at 6:47 P. M.
7:00 P. M.	Heterodyne interference ¾ intensity of program.
7.15 P. M.	Same as 7:00 P. M.
7:30 P. M.	Heterodyne of complex nature and same intensity as the program.

7:45 P. M.	Program covered completely by heterodyne interference. Impossible to identify any of the interfering stations.
8:00 P. M.	Same as 7:45 P. M.
8:15 P. M.	Same as 7:45 P. M.
8:30 P. M.	Same as 7:45 P. M.

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8:45 P. M.	Same as 7:45 P. M.
9:00 P. M.	Same as 7:45 P. M.
9:15 P. M.	Same as 7:45 P. M.
9:30 P. M.	Same as 7:45 P. M.
9:45 P. M.	Same as 7:45 P. M.
10:00 P. M.	Same as 7:45 P. M.
10:15 P. M.	Same as 7:45 P. M.
10:30 P. M.	Same as 7:45 P. M.
10:45 P. M.	Same as 7:45 P. M.
11:00 P. M.	Same as 7:45 P. M.
11:15 P. M.	Same as 7:45 P. M.
11:30 P. M.	Same as 7:45 P. M.
11:45 P. M.	Same as 7:45 P. M.
12:00 Midnight.	Same as 7:45 P. M.

Comments.

WBCM's intensity was much greater in Holly than at Sanilac, during the daytime. WBCM and WXYZ were the same intensity, and WWJ had a slightly greater field strength than either WBCM or WXYZ.

Heterodyne interference was not noticed on WBCM's carrier until 6:00 P. M., one hour and forty-five minutes later than at Sanilac. WMBC's intensity was weaker at Holly than at Sanilac.

WBCM was completely covered by heterodyne interference at 7:45 P. M., one hour later than at Sanilac.

It was impossible to identify any stations between WHK, on 1390 kilocycles, and WMBD, on 1440 kilocycles, between 7:45 P. M. and midnight.

199 Mason, Michigan. 1,410 Kilocycles. April 8, 1931.

4:00 P. M. WBCM's intensity same as at Sanilac. WBCM and WXYZ same intensity, and WWJ fifteen d. b. higher than WBCM. WFDF's intensity very low—about fifteen d. b. lower than WBCM. No heterodyne interference noticed on 1,410 kilocycles.

4:15 P. M. Same as 4:00 P. M.

4:30 P. M. Same as 4:00 P. M.

4:45 P. M. Same as 4:00 P. M.

5:00 P. M. Slight heterodyne interference noticed on WBCM's carrier, caused by WMBC, Detroit, operating on 1,420. Heterodyne frequency approximately eight or nine thousand cycles.

5:15 P.M. Fading noticed on WBCM's carrier, causing audio frequency distortion. Fading alternates from maximum to minimum every three minutes. Same distortion noticed on WXYZ, but to a greater extent.

5:30 P. M. Periodic fading still noticed. Heterodyne audibility same as 5:00 P. M.

5:45 P. M. Carrier intensity decreased slightly and heterodyne interference increased.

6:00 P. M. WBCM's audibility twelve d. b. below WXYZ, and fading still noticed. Heterodyne interference 1/2 program intensity.

6:15 P. M. Same as 6:00 P. M.

6:30 P. M. Carrier intensity decreased still more and heterodyne interference 3/4 intensity of program.

6:45 P. M. Program completely covered by complex heterodyne interference. Unable to identify any of interfering stations.

7:00 P. M. Same as 6:45 P. M.

7:15 P. M. Same as 6:45 P. M.

7:30 P. M. Same as 6:45 P. M.

7:45 P. M. Same as 6:45 P. M.

8:00 P. M. Same as 6:45 P. M.

8:15 P. M. Same as 6:45 P. M.

8:30 P. M. Same as 6:45 P. M.

8:45 P. M. Same as 6:45 P. M.

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9:00 P. M.	Same as 6:45 P. M.
9:15 P. M.	Same as 6:45 P. M.
9:30 P. M.	Same as 6:45 P. M.
9:45 P. M.	Same as 6:45 P. M.
10:00 P. M.	Same as 6:45 P. M.
10:15 P. M.	Same as 6:45 P. M.
10:30 P. M.	Same as 6:45 P. M.
10:45 P. M.	Same as 6:45 P. M.
11:00 P. M.	Same as 6:45 P. M.
11:15 P. M.	Same as 6:45 P. M.
11:30 P. M.	Same as 6:45 P. M.
12:00 Midnight.	Same as 6:45 P. M.

Comments.

WBCM's daytime intensity approximately the same as at Holly. Reception clear until 5:00 P. M., when WMBC's carrier heterodyned with WBCM's.

WBCM's program covered completely by heterodyne interference at 6:45 P. M., and remained so for the rest of the evening.

Audio frequency distortion caused by periodic fading of the carrier was noticed in the late afternoon. However, the same distortion was noticed on other Michigan stations.

No stations could be identified between WHK, on 1390 kilocycles, and WJSV, on 1450 kilocycles, between 6:45 P. M. and midnight.

201 Reed City, Michigan. 1,410 Kilocycles. April 9, 1931.

When observations were begun at 7:00 P. M., the heterodyne interference was so great that it was impossible to hear WBCM's carrier or program. The heterodyne interference continued throughout the evening, and corresponded very closely in intensity to observations made April 7th, and 8th.

Inquiries show that WBCM is heard consistently during the daytime, but not in the evening.

WJR's intensity very low. WWJ and WXYZ were covered by heterodyne interference after 8:00 P. M.

A listening test was made on 1410 kilocycles at 8:30 A. M., April 10th, and WBCM and WHBL were logged. The difference in carrier frequencies was approximately forty cycles. WBCM's intensity slightly greater than WHBL.

202 Grayling, Michigan. 1,410 Kilocycles. April 10, 1931.

3:00 P. M. WBCM's intensity very good—the loudest station on the air at this point. WBCM is about fifteen d. b. above WJR, the next loudest station. WWJ intensity very low, and WXYZ inaudible.

3:30 P. M. WHBL heterodyning with WBCM. The difference between the two carriers is approximately fifteen cycles. The program intensity of WHBL is very low, but the low frequency heterodyne causes serious interference with WBCM's program.

4:00 P. M. WHBL's carrier not detected. WBCM's intensity very good.

4:30 P. M. Faint heterodyne. Unable to determine station causing interference.

5:00 P. M. Complex heterodyne but program well above intensity of interference.

5:30 P. M. WBCM's intensity decreased to the same as WJR's. Heterodyne interference stronger, but the programs is still coming through very good.

5:45 P. M. Heterodyne interference has increased to ½ the intensity of the program.

6:00 P. M. Program covered completely by heterodyne interference. Unable to identify any of the interfering stations.

6:15 P. M. Same as 6:00 P. M. WSBT and WHK very loud.

6:30 P. M. Same as 6:00 P. M.

6:45 P. M. Same as 6:00 P. M.
WCAH coming in very good. WXYZ logged.

7:00 P. M. Same as 6:00 P. M.
Serious fading on WHK.

7:15 P. M. Same as 6:00 P. M.
Serious fading on WJR. Heterodyne on WWJ and WXYZ.

7:30 P. M. Same as 6:00 P. M.
WHK and WCAH covered by heterodyne interference. WCKY coming through very good.

7:45 P. M. Same as 6:00 P. M.
WWJ and WXYZ covered by heterodyne interference.

8:00 P. M. Same as 6:00 P. M.

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8:15 P. M. Same as 6:00 P. M.
8:30 P. M. Same as 6:00 P. M.
8:45 P. M. Same as 6:00 P. M.
9:00 P. M. Same as 6:00 P. M.
9:15 P. M. Same as 6:00 P. M.
9:30 P. M. Same as 6:00 P. M.
9:45 P. M. Same as 6:00 P. M.
10:00 P. M. Same as 6:00 P. M.
WJR faded out completely. No Michigan stations audible.
10:15 P. M. Same as 6:00 P. M.
10:30 P. M. Same as 6:00 P. M.
10:45 P. M. Same as 6:00 P. M.
11:00 P. M. Same as 6:00 P. M.
11:15 P. M. Same as 6:00 P. M.
11:30 P. M. Same as 6:00 P. M.
11:45 P. M. Same as 6:00 P. M.
12:00 Midnight. Same as 6:00 P. M.

Comments.

WBCM's intensity greatest of all stations during the daytime, although heterodyne interference experienced at times from WHBL, Sheboygan, Wisconsin.

Impossible to hear WBCM's program between 6:00 P. M. and midnight.

Impossible to hear any Michigan station after 10:00 P. M.

204 East Tawas, Michigan. 1,410 Kilocycles. April 11, 1931.

12:00 Noon. WBCM's audibility very good, and no heterodyne interference noticed. WBCM at least fifteen d. b. above WJR, the next loudest station. Reports from residents claim that a low frequency heterodyne has been causing interference with WBCM during the last three months. Probably caused by WHBL, Sheboygan.

205 Lincoln, Michigan. 1,410 Kilocycles. April 11, 1931.

4:00 P. M. WBCM coming through very good. About fifteen d. b. above WJR, the next loudest station. WWJ and WXYZ inaudible. No interference noticed.

5:00 P. M. Same as 4:00 P. M.

5:30 P. M. Intensity same as 4:00 P. M. Slight high pitched heterodyne noticed, caused by station operating on next higher channel.

5:45 P. M. Intensity same as 4:00 P. M. Heterodyne interference has increased, but has not become objectionable.

6:00 P. M. Intensity same as 4:00 P. M. Some fading noticed that caused audio frequency distortion of the program. Periods of fading irregular and of small duration.

6:15 P. M. Audibility slightly lower than 4:00 P. M. Heterodyne interference ½ program intensity.

6:30 P. M. Audibility same as 6:15 P. M., but heterodyne interference greater, although program still intelligible.

6:45 P. M. Same as 6:30 P. M.

7:00 P. M. Test with one thousand watts.

Notic-able increase in audibility of program, with a corresponding decrease of heterodyne interference. Fading more noticeable than with five hundred watts, but periods of fading with attendant distortion very short.

Intensity about twenty d. b. above WJR, the next loudest station.

Heterodyne interference not objectionable.

7:12 P. M.	Program faded to same intensity as heterodyne interference.
7:14 P. M.	Program again audible, but not so loud as 7:00 P. M.
7:30 P. M.	Program still coming through, but fading very noticeable. Low frequency heterodyne also detected.
7:45 P. M.	Program covered completely by heterodyne interference.
8:00 P. M.	Same as 7:45 P. M.
8:15 P. M.	Same as 7:45 P. M.
8:30 P. M.	Same as 7:45 P. M.
8:45 P. M.	Same as 7:45 P. M.
9:00 P. M.	Same as 7:45 P. M.
9:15 P. M.	Same as 7:45 P. M.

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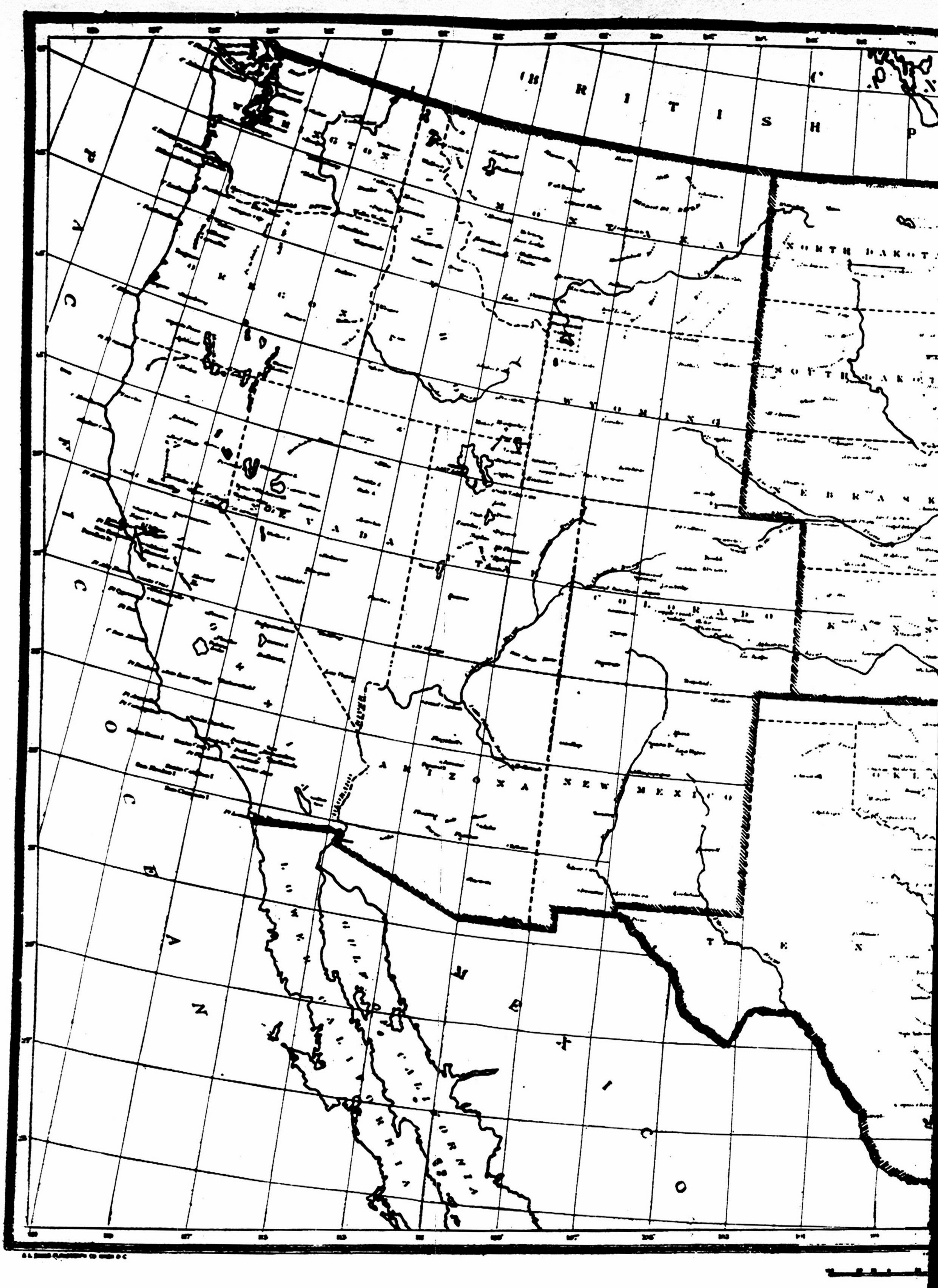
9:30 P. M.	Same as 7:45 P. M.
9:45 P. M.	Same as 7:45 P. M.
10:00 P. M.	Test with one thousand watts. Program just audible through interference.
10:15 P. M.	Same as 10:00 P. M.
10:30 P. M.	Program covered completely by heterodyne interference.
10:45 P. M.	Same as 10:30 P. M.
11:00 P. M.	Same as 10:30 P. M.
11:15 P. M.	Same as 10:30 P. M.
11:30 P. M.	Same as 10:30 P. M.
11:45 P. M.	Test with one thousand watts. Same as 10:30 P. M.
12:00 Midnite.	Same as 10:30 P. M.

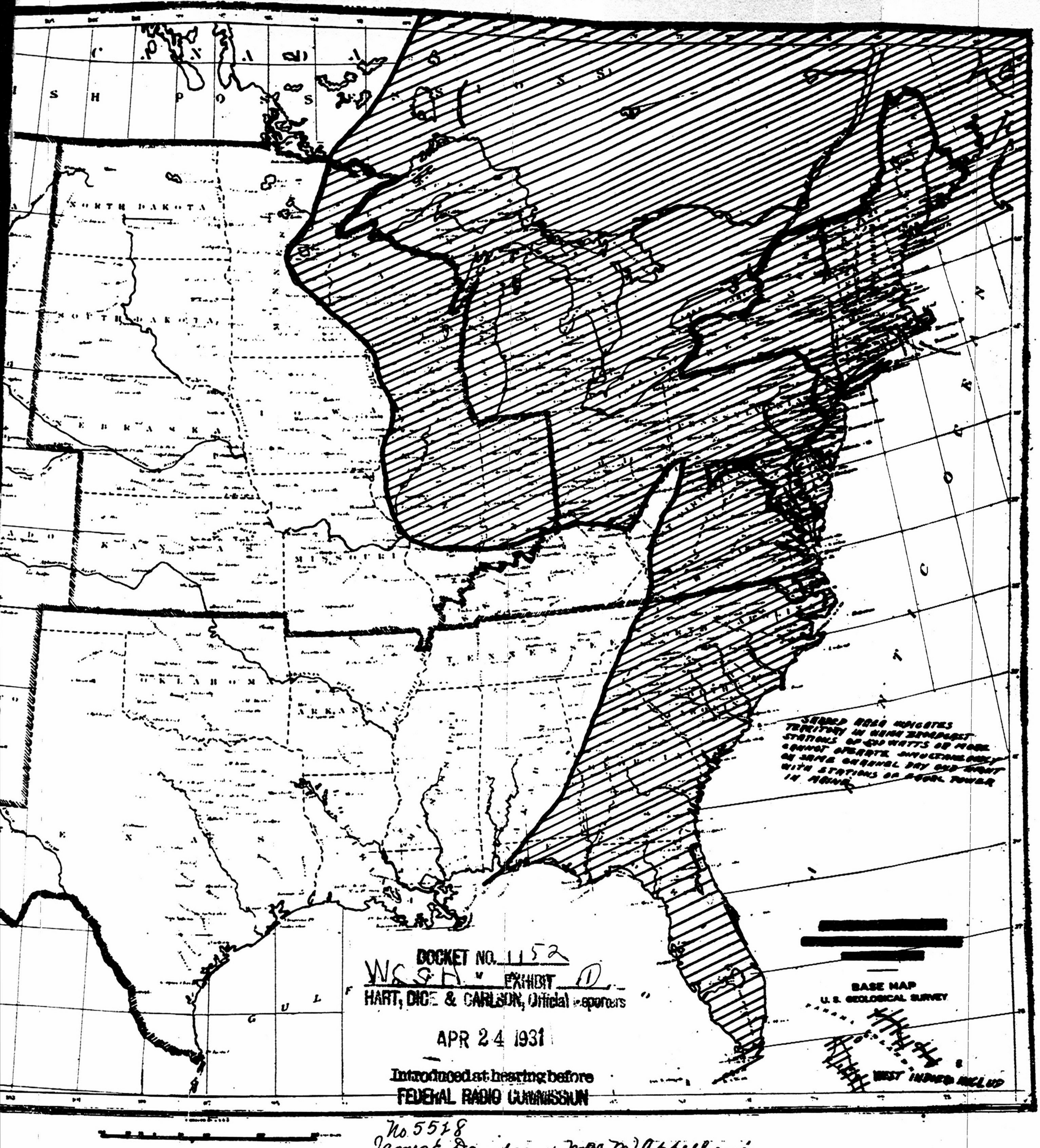
Comments.

WBCM much louder than any other station during the daytime. Heterodyne interference covered program completely from 7:30 P. M. until midnight. Low frequency heterodyne also noticed on 1410 kilocycles from 7:30 P. M. until midnight.

RALPH H. CARPENTER.

(Here follow WCSH Exhibits 1 and 2, side folios 207 and 208.)


BRITISH P
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLA
WASHINGTON
MONTANA
OREGON
IDAHO
WYOMING
NEVADA
UTAH
COLORADO
CALIFORNIA
ARIZONA
NEW MEXICO
TEXAS
PACIFIC OCEAN
MEXICO
LOWER CALIFORNIA
GULF OF CALIFORNIA



[redacted]

DOCKET NO. 1152
WCSH v EXHIBIT (1)
HART, DICE & CARLSON, Official Reporters

APR 24 1931

Introduced at hearing before
FEDERAL RADIO COMMISSION

No 5518
James E. Davidson (WBCM) Appellant,
vs.
The Federal Radio Commission et al

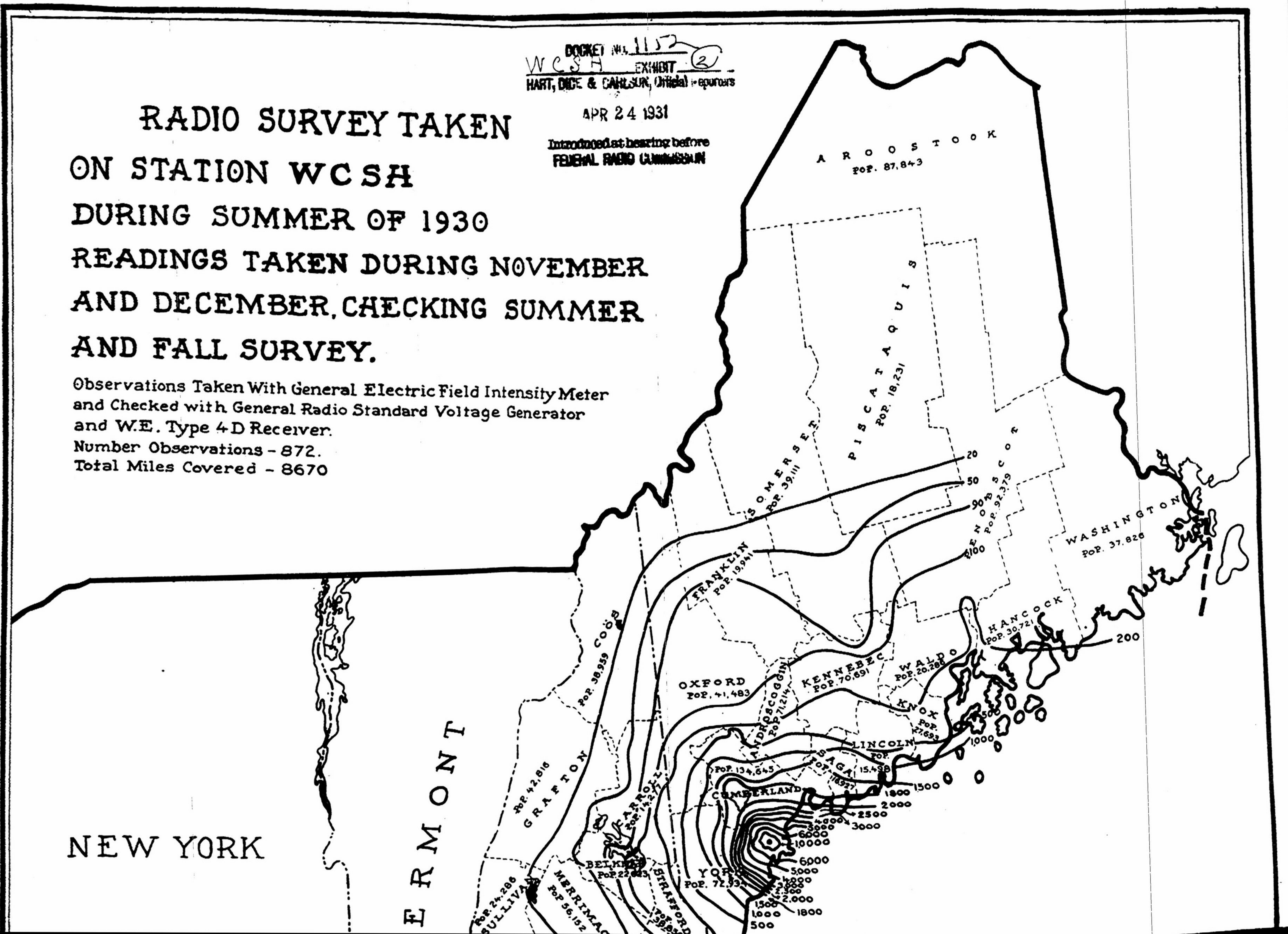
DOCKET No. 1152
WCSH EXHIBIT ②
HART, DICE & CARLSON, Official Reporters

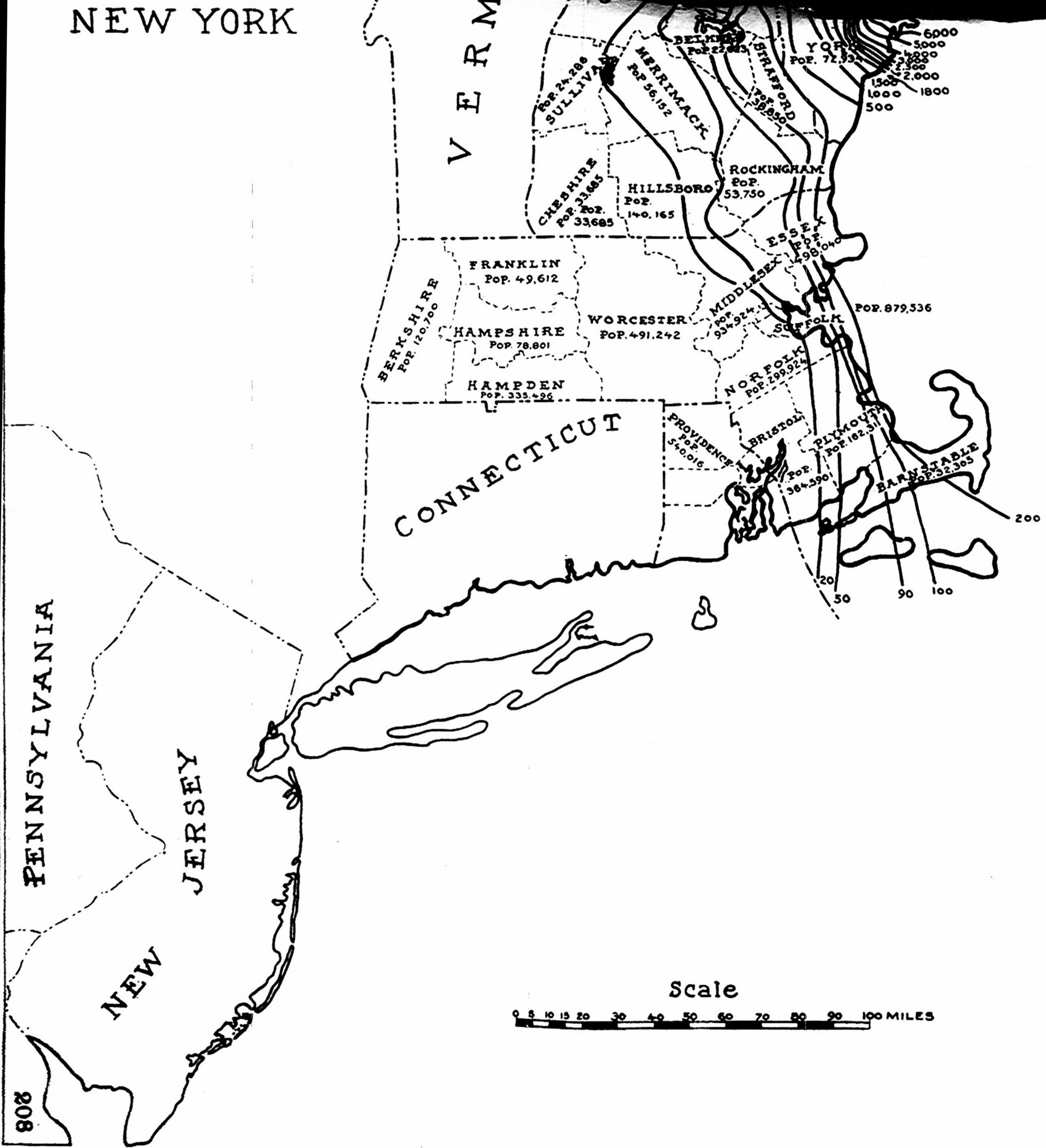
APR 24 1931

Introduced at hearing before
FEDERAL RADIO COMMISSION

RADIO SURVEY TAKEN ON STATION WCSH DURING SUMMER OF 1930 READINGS TAKEN DURING NOVEMBER AND DECEMBER, CHECKING SUMMER AND FALL SURVEY.

Observations Taken With General Electric Field Intensity Meter and Checked with General Radio Standard Voltage Generator and W.E. Type 4 D Receiver.
Number Observations - 872.
Total Miles Covered - 8670





No. 5578
James E. Davidson (WBCM) Appellant,
vs.
The Federal Radio Commission et al

Survey Taken By.
W. L. Foss

209 WCSH Ex. 3 & 4.

The Eastland at Portland, WCSH.

Tuesday, April 7, 1931.

8:00	WEAF	Quaker Early Birds.
8:15	WEAF	Morning Devotions.
8:30	WEAF	Cheerio.
9:00	....	Morning Organ Melodies.
9:15	WEAF	Campbell Soup Prog.
9:45	WEAF	A. & P. Food Prog.
10:00	....	Chipmans Housewives Hour.
10:30	WEAF	To be announced.
10:45	....	Studio Prog.
11:00	WEAF	Your Child—Grace Abbott.
11:15	WEAF	Household Institute.
11:30	....	Studio Prog.
11:45	....	Stocks—Weather.
11:50	....	Evening Express News.
12:00	....	Studio Prog.
12:15	....	Farm Flashes.
12:30	....	Studio Prog.
12:45	....	Lions Club.
2:30	WEAF	Edna Wallace Hopper.
2:45	....	Shoppers Service.
4:00	....	Merchants Air Review.
5:00	WEAF	Ponds Afternoon Tea.
5:30	WEAF	Rinso Talkies.
5:45	....	Closing Stocks—Weather.
6:00	....	Dinner Concert.
6:15	....	Press Herald News.
6:25	....	Studio Prog.
6:30	....	The Caravan.
7:00	WEAF	Voters Service.
7:30	WEAF	Socnyland Sketches.
8:00	WEAF	Blackstone Plantation.
8:30	WEAF	Florsheim Frolic.
9:00	WEAF	McKesson Musical Magazine.
9:30	WEAF	Happy Wonder Bakers.
10:00	WEAF	B. A. Rolfe and His Lucky Strike Orch.
11:00	....	Homers Correct Time.
11:01	....	Press Herald News.

Wednesday, April 8, 1931.

8:00	WEAF	Quaker Early Birds.
8:15	WEAF	Morning Devotions.
8:30	WEAF	Cheerio.
9:00	....	Morning Organ Melodies.
9:15	WEAF	Campbell Soup Prog.
9:45	WEAF	A. & P. Food Prog.
10:00	WEAF	Reefers No Moth Inc. Prog.
10:15	WEAF	National Home Hour.
10:45	WEAF	Wildroot Institute—Elizabeth May.
11:00	WEAF	Dr. Ruth Wadsworth.
11:15	WEAF	Household Institute.
11:45	....	Studio Prog.
12:00	....	Stocks—Weather.
12:05	....	Evening Express News.
12:15	....	Farm Flashes.
12:30	....	State Fed. Women's Club Prog.
1:00	....	Westbrook Merchants Hour.
2:30	....	Shoppers Service.
3:30	WEEI	N. E. Kitchen of the Air.
4:00	....	Studio Prog.
4:30	....	National Enameling & Stamping Prog.
4:45	....	Merchants Air Review.
5:45	....	Closing Stocks—Weather.
6:00	....	Dinner Concert.
6:15	....	Press Herald News.
6:25	....	The Sport of Walking.
6:30	....	Tastyeast Jesters.

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6:45	WEAF	Uncle Abe & David.
7:00	....	State Public Health Talk.
7:15	....	New England Coke Orch.
7:30	....	Money Talks—Mrs. Annie Peaks Kenney—Portland National Bank.
7:45	....	Studio Prog.
8:00	WEAF	Listerine Prog. Bobby Jones Golf Chat.
8:15	WEAF	Radiotron Varieties.
8:30	WEAF	Mobiloil Concert Orch.
9:00	WEAF	Halsey-Stuart.
9:30	WEAF	Palmolive Hour.
10:30	WEAF	Coca Cola Prog.

11:00	WEAF	Radio Digest—Nellie Revelle.
11:15	....	Homers Correct Time.
11:16	....	Press Herald News.

Thursday, April 9, 1931.

8:00	WEAF	Quaker Early Birds.
8:15	WEAF	Morning Devotions.
8:30	WEAF	Cheerio.
9:00	....	Morning Organ Melodies.
9:15	WEAF	Campbell's Soup Prog.
9:45	WEAF	A. & P. Food Prog.
10:00	WEAF	Ceresota Flour Prog.
10:15	WEAF	The Master Gardener.
10:30	....	Baxter's Finest Prog.
10:45	....	Charis Prog.
11:00	....	Studio Prog.
11:15	WEAF	Household Institute.
11:30	....	Studio Prog.
11:45	....	Stocks—Weather.
11:50	....	Evening Express News.
12:00	....	Extension Service Pointers.
12:15	....	Farm Flashes.
12:30	....	Church Federation Midweek Service.
2:30	WEAF	Edna Wallace Hopper.
2:45	....	Shoppers Service.
4:00	....	Y. W. C. A. Educational Series.
4:30	....	Merchants Air Review.
5:30	WEAF	Rinso Talkies.
5:45	....	Closing Stocks—Weather.
6:00	....	Dinner Concert.
6:15	....	Press Herald News.
6:25	....	The Sport of Walking.
6:30	....	Sandy and Lil.
6:45	WEAF	Uncle Abe & David.
7:00	....	Chevrolet Chronicles.
7:30	....	Pine Tree Folks.
8:00	WEAF	Fleischmann Hour.
9:00	WEAF	Arco Birthday Party.
9:30	WEAF	Jack Frost Melody Moments.
10:00	WEAF	B. A. Rolfe and His Lucky Strike Orch.
11:00	....	Homers Correct Time.
11:01	....	Press Herald News.

Friday, April 10, 1931.

8:00	WEAF	Quaker Early Birds.
8:15	WEAF	Morning Devotions.
8:30	WEAF	Cheerio.
9:00	....	Morning Organ Melodies.
9:15	WEAF	Campbell Soup Prog.
9:45	WEAF	A. & P. Food Prog.
10:00	WEAF	National Home Hour.
11:00	WEAF	Music Appreciation Hour.
12:00	....	Stocks—Weather.
12:05	....	Evening Express News.
12:15	....	Farm Flashes.
2:30	....	Shoppers Service.
3:30	WEEI	N. E. Kitchen of the Air.
4:00	....	Studio Prog.
4:30	....	Merchants Air Review.
5:30	WEAF	The Benj. Moore Triangle.
5:45	....	Closing Stocks—Weather.
6:00	....	Dinner Concert.
6:15	....	Press Herald News.
6:25	....	Dyer Knight "Hints to Motorists."
6:30	....	Tastyeast Jesters.

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6:45	WEAF	Uncle Abe & David.
7:00	....	Portland Mens Singing Club.
7:30	WEAF	Capitol Theatre Prog.
7:45	....	The Ruralists.
8:00	WEAF	Cities Service Cavaliers.
9:00	WEAF	Cliquot Club.
9:30	WEAF	Enna Jettick Songbird.
9:45	WEAF	The Two Troupers.
10:00	WEAF	Kodak Weekend Hour.
10:30	WEAF	Radio Keith Orpheum Hour.
11:00	....	Homers Correct Time.
11:01	....	Press Herald News.

Saturday, April 11, 1931.

8:00	WEAF	Quaker Early Birds.
8:15	WEAF	Morning Devotions.
8:30	WEAF	Cheerio.
9:00	....	Morning Organ Melodies.

9:15	WEAF	Campbell Soup Prog.
9:45	WEAF	A. & P. Food Prog.
10:00	....	Studio Prog.
10:15	WEAF	Proctor & Gamble.
11:15	WEAF	Household Institute.
11:30	WEAF	Keys to Happiness.
12:00	....	Stocks—Weather.
12:05	....	Evening Express News.
3:00	....	Shoppers Service.
4:30	....	Merchants Air Review.
5:45	....	Closing Stocks—Weather.
6:00	....	Dinner Concert.
6:15	....	Evening Express News.
6:25	....	Civil Service Opportunities.
6:30	....	Federal Furni*ut*re Prog.
6:45	WEAF	Unc*el* Abe & David.
7:00	WEAF	Vocal Soloists.
7:15	WEAF	Laws that Safeguard Society.
7:30	WEAF	Club Valspar—Ted Lewis.
8:00	WEAF	Webster Prog.—Weber and Fields.
8:15	WEAF	Radiotron Varieties.
8:30	....	Studio Prog.
9:00	WEAF	General Electric Hour.
10:00	WEAF	B. A. Rolfe and His Lucky Strike Orch.
11:00	....	Homers Correct Time.
11:01	....	Sunday Telegram News.

Sunday, April 12, 1931.

9:00	....	13 Class—St. Lawrence Church.
10:15	....	Studio Prog.
10:30	WEAF	Troika Bells.
11:00	....	State St. Cong. Church.
12:15	WEAF	Roxy Symphony Concert.
12:45	WEAF	Echoes of the Orient.
1:00	WEAF	National Oratorio Soc.
1:30	....	First Radio Parish Church of America.
2:30	....	Maine Fed. Music Clubs.
3:00	....	Maine Lumber Dealers Prog.
3:30	WEAF	Swift Garden Prog.
4:00	WEAF	Dr. S. Parkes Cadman Hour.
5:00	WEAF	The Davey Tree Surgery Hour.

6:00	WEAF	Catholic Hour.
7:00	WEAF	Old Stagers Memories.
7:30	WEAF	RCA Victor Prog.
8:00	WEAF	Chase & Sanborn Prog.
9:00	WEAF	David Lawrence.
9:15	....	Strand Theatre Organ.
9:45	WEAF	Iodent Club of the Air.
10:15	WEAF	National Dairy Productions.
10:45	WEAF	Sunday at Seth Parkers.
11:15	....	Press Herald News.

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8:00	WEAF	Quaker Early Birds.
8:15	WEAF	Morning Devotions.
8:30	WEAF	Cheerio.
9:00	....	Morning Organ Melodies.
9:15	WEAF	Campbell Soup Prog.
9:45	WEAF	A. & P. Food Prog.
10:00	....	The Fashionaire of Munsingwear.
10:15	....	Studio Prog.
10:30	WEAF	American Red Cross Prog.
11:00	....	Studio Prog.
11:15	WEAF	Household Institutte.
11:30	....	Studio Prog.
11:45	....	Stocks—Weather.
11:50	....	Evening Express News.
12:00	....	Amer. Farm Bureau Fed. News.
12:10	....	Farm Flashes.
12:25	....	Studio Prog.
1:00	....	Civitans Club.
2:15	....	Amer. Legion Auxiliary Prog.
2:30	....	Shoppers Service.
3:30	WEEI	N. E. Kitchen of the Air.
4:00	....	Studio Prog.
4:30	....	Automatic Duo Disc.
4:45	....	Merchants Air Review.
5:15	....	Pyrofax Prog.
5:30	....	Studio Prog.
5:45	....	Closing Stocks—Weather.
6:00	....	Dinner Concert.
6:15	....	Press Herald News.
6:25	....	Lewiston Buick Tips.

6:30	....	Philco Prog.
7:00	....	The Wayside Philosopher.
7:15	....	N. E. Coke Orch.
7:30	....	Arkansas Soft Pine.
7:45	......	The Ruralists.
8:00	WEAF	How's Business—Merle Thorpe.
8:15	WEAF	Pennzoil Pete.
8:30	WEAF	A. & P. Gypsies.
9:30	WEAF	General Motors Prog.
10:00	WEAF	Adventures of Sherlock Holmes.
10:30	WEAF	Thos. Jefferson Birthday Prog.
11:15	....	Homers Correct Time.
11:16	....	Press Herald News.

PRACTICE *and* PROCEDURE

BEFORE THE

FEDERAL RADIO COMMISSION

WASHINGTON, D. C.

PRACTICE *and* PROCEDURE

BEFORE THE

FEDERAL RADIO COMMISSION

WASHINGTON, D. C.

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1930

C. McK. SALTZMAN, *Chairman.*
EUGENE O. SYKES, *Vice Chairman.*
HAROLD A. LAFOUNT.
W. D. L. STARBUCK.
IRA E. ROBINSON.

JAMES W. BALDWIN, *Secretary.*

THAD H. BROWN, *General Counsel.*
BEN S. FISHER, *Assistant General Counsel.*
DUKE M. PATRICK, *Assistant General Counsel.*
PAUL D. P. SPEARMAN, *Assistant General Counsel.*
C. B. JOLLIFFE, *Chief Engineer.*
V. FORD GREAVES, *Assistant Chief Engineer.*

II

FEDERAL RADIO COMMISSION

Washington, D. C.

GENERAL ORDER No. 93

At a session of the Federal Radio Commission held at its offices in Washington, D. C., on the 25th day of June, 1930,

It is Ordered that the following rules and regulations pertaining to practice and procedure before the commission be, and the same are hereby, adopted.

It is Further Ordered that all general orders or parts thereof and all rules and regulations in conflict therewith be, and the same are hereby, repealed.

It is Further Ordered that this general order be effective on September 1, 1930.

Federal Radio Commission,
By James W. Baldwin,
Secretary.

PRACTICE AND PROCEDURE BEFORE THE FEDERAL RADIO COMMISSION

Subtitle A.—GENERAL

SECTION 1. **Office of the commission.**—The principal office of the commission shall be located at Washington, D. C. Except for Sundays and legal holidays throughout the year and except for Saturdays after 1 o'clock p. m. during the period from June 1 to October 1 (both inclusive), the office will be open every day from 9 a. m. to 4.30 p. m.

SEC. 2. **Meetings of the commission.**—All meetings of the commission, unless otherwise determined by a majority of its members, shall be held at the principal office of the commission. The commission will, however, meet at another place if so determined by a majority of its members and may, by one or more of its members, or by such examiner or other employee as it may designate, hold hearings, conduct investigations, and prosecute any inquiry necessary to its duties at any other place.

SEC. 3. **Secretary to sign instruments of authorization and orders.**—All instruments of authorization granted by the commission and all orders issued by it shall, unless otherwise specifically provided by order of the commission, be signed by the secretary in the name of the commission.

SEC. 4. **Official record.**—The official record of any action of the commission, other than in connection with or as the result of hearings on applications or revocation proceedings, shall be the minutes of such session, kept by and in the custody of the secretary. The official record of any action by the commission made in connection with or as the result of any such a hearing, shall be the order of the commission entered and filed in the appropriate hearing docket file. Such official records shall be subject to inspection at the office of the secretary during business hours.

SEC. 5. **Files.**—The files of the commission shall not be open to inspection by the public except as follows:

(*a*) Hearing docket files shall be open to inspection by anyone.

(*b*) Copies of current permits, licenses, and other instruments of authorization shall be open to inspection by anyone having a legitimate interest therein.

(*c*) Applications shall be open to inspection by the applicant himself or by any parties interested in the granting or denial of said applications.

Sec. 6. **Seal.**—The seal of the commission shall be affixed to all permits, licenses, and other instruments of authorization granted, and all orders issued by, the commission.

Sec. 7. **Certified copies.**—A copy of any instrument or authorization granted by the commission, or of an order issued by the commission, or of any public record of the commission, will be certified to by the secretary of the commission under its seal. Any cost that may be necessary in preparing such copy shall be prepaid by the person requesting it.

Sec. 8. **Official reporter.**—The commission will designate from time to time an official reporter for the taking down and transcribing of its proceedings. No transcript of the testimony taken or argument had at any hearing held by the commission will be furnished to any party or to any other person by the commission; such transcript must be obtained directly from the official reporter.

Sec. 9. **Copies.**—Where, under these regulations, any document is permitted or required to be filed in connection with any hearing, it shall be necessary to file the same in duplicate unless otherwise expressly provided.

Sec. 10. **Additional time to parties in certain cases.**—Where, under these regulations, any limitation is made as to the time within which any document is required to be filed, or any other procedural step is required to be taken in connection with any hearing, parties who are residents of the fifth zone shall have an additional period of five days and parties who reside beyond the confines of the continental United States shall have an additional period of 20 days within which to file such document or take such other procedural step.

Sec. 11. **Attorneys.**—Any party to a proceeding before the commission may appear and be heard in person, by agent with power of attorney, or by attorney at law. All attorneys at law appearing must conform to the standard of ethical conduct required of practitioners before the courts of the United States.

Subtitle B.—ACTION ON APPLICATIONS

Section 1. **Applications returned without action.**—Any application which is not filed in accordance with the commission's regulations or, if properly filed, does not comply with the regulations with respect to the form used, manner of execution, completeness of answer to questions, or any other information required will not be entered on the records of the commission or considered by the

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commission. Each such application shall be returned to the applicant by the secretary of the commission together with a brief statement of the respect in which the application is defective.

SEC. 2. **Refiling of applications.**—Upon the return of any such defective application, as provided in section 1, the applicant may either (*a*) correct the defective application and refile the same, or (*b*) if it is nevertheless believed to be sufficient, he may refile it without correction.

SEC. 3. **Applications denied without hearing.**—In the event that any defective application returned to the applicant is refiled without correction, as provided for in subdivision (*b*) of section 2, or where it appears from the face of any application or from any documents accompanying it that the instrument of authorization in question is one which may not be granted by the commission, or that the applicant is not eligible to receive such instrument under the laws or treaties of the United States, or under the terms of these regulations, the commission may deny such application without hearing and the secretary shall promptly mail a written notice of such denial to the applicant setting forth a brief statement of the reasons for such action.

SEC. 4. **Hearings granted where interpretation of law, treaty, or regulation involved.**—In any case enumerated in section 3, where the proper interpretation or application of the laws or treaties of the United States, or the proper interpretation or application, or the validity of the regulations of the commission is involved, the applicant may, by written request filed with the secretary, not later than 15 days from the date of mailing of the notice of denial by the secretary, have his application entered on the hearing docket and obtain a hearing with respect to such question or questions. The applicant shall in such written request specify the respects in which it is believed that the law or treaties or regulations have been wrongly interpreted or applied, or that the regulation is invalid, and the hearing will be limited to the issues thus presented. The time and place of hearing shall be fixed in the same manner as other applications designated for hearing and, pending such hearing, the effective date of the commission's denial shall be postponed to the date of the commission's decision after hearing. The commission may, after hearing or default, again deny the application or may, after hearing, set aside its previous denial thereof and proceed to consider the application on its merits in the same manner as other applications.

SEC. 5. **Applications granted without hearing.**—The commission will grant an application in whole or in part without hearing on the merits if it does not fall within any of the cases covered by sections 1 and 3 of this subtitle, or if it has been determined to be proper after a hearing pursuant to section 4 and in addition thereto it appears conclusively to the commission from the face of such application, from documents submitted therewith and from such other information as the commission may have—

(*a*) That the granting of such application either in whole or in part would serve public interest, convenience and necessity, and

(*b*) That the granting of such application either in whole or in part would not aggrieve or adversely affect the interest of any person, firm, company, or corporation holding a permit, license or other instrument of authorization from the commission, or having an application therefor pending before the commission.

In any case where the application is for a license or for a modification of license, pursuant to a construction permit previously granted by the commission, such license or modification of license will be granted without hearing if it appears conclusively to the commission that all the terms, conditions, and obligations set forth in the application for construction permit and in the permit have been fully met and that no causes or circumstances have arisen since the granting of such permit which would make the granting of said license or modification of license against public interest.

SEC. 6. **Hearings in cases where applications are granted in part.**—Where any application is granted by the commission in part or with any privileges, terms, or conditions other than those requested pursuant to section 5 and without a hearing thereon, the action of the commission shall be considered as the granting of such application unless the applicant shall, within 15 days of the date of mailing by the secretary of his written notice of such action, file with the commission a written request for a hearing with respect to the part or with respect to the privileges, terms, or conditions not granted. The request for hearing shall be accompanied by a statement in writing of the facts which the applicant expects to prove upon such hearing. Upon the receipt of such request and statement in proper form, the application will be set for hearing in the same manner as other applications are set for hearing and the applicant and other parties in interest notified thereof. Within a period of 10 days from the receipt of such notice of hearing the applicant shall deliver or mail a copy of the statement of facts to be proved by it to all other parties notified of the hearing and shall file with the commission an affidavit stating that this requirement has been met. The evidence to be offered by any applicant upon such hearing shall be limited to the matter contained in the applicant's written statement of facts to be proved by it. Pending such hearing the effective date of the commission's action with respect to such application shall be postponed to the date of the commission's decision after hearing.

Sec. 7. **All other applications designated for hearing.**—In cases where the application is or has, pursuant to section 4 hereof, been determined to be proper upon its face but the commission is unable to determine without a hearing on the merits;

> (*a*) That the granting of such application either in whole or in part would serve public interest, convenience, or necessity;
>
> (*b*) That the granting of such application either in whole or in part would not aggrieve or adversely affect the interest of any person, firm, company, or corporation holding a permit, license, or other instrument of authorization from the commission, or having an application therefor pending before the commission,

the commission will designate the same for hearing and the following procedure will govern:

(1) The secretary shall forthwith mail a written notice to the applicant setting forth the action of the commission (together with such statement of the commission's reasons therefor as shall be appropriate to the nature of the application), the time and place for hearing and a list of the other parties notified thereof.

(2) In order to avail himself of the opportunity to be heard, the applicant shall, within 20 days of the mailing of the notice by the secretary, file with the commission a written appearance consisting of a statement of his desire to be heard, together with a statement in writing of the facts which he expects to prove at such hearing and an affidavit showing that a copy of such written statement has been served upon or mailed to all other parties notified of the hearing.

(3) In case no appearance or statement in writing of the facts to be proved upon such hearing is filed by the applicant within the time so specified (or any extension thereof as the commission may grant upon proper showing), the applicant will be defaulted and the application denied without a hearing and the secretary shall so notify the other parties to the hearing.

(4) In case the appearance and statement in writing of the facts to be proved is duly and seasonably filed, the application will be entered upon the hearing docket.

(5) If at the date set for hearing, either originally or as a result of continuances, the applicant does not appear, a default will be entered and the commission will deny the application.

(6) After a hearing has been held in accordance with the foregoing, the commission may grant the application, deny it, or grant it in part, or deny it in part.

(7) A partial denial of any application after hearing thereon shall be considered as a denial of the application.

Sec. 8. **Repetition of applications.**—Where an applicant has more than one application pending for essentially the same instrument of authorization, with respect to the character of station, type of service and the territory sought to be served, the commission shall determine which of such applications shall be first considered by it. Where an applicant has been afforded an opportunity to be heard with respect to a particular application and the commission has, after hearing or default, denied the application, the commission will not consider or designate for hearing another application by the same applicant, or for his successor or assignee, until after the lapse of periods of time as follows:

(*a*) Where the second application is for exactly or substantially the same instrument of authorization with respect to the privileges, terms and conditions requested, and the territory sought to be served, a period of 12 months must elapse from and after the date of the commission's denial of the first application.

(*b*) Where the second application is for the same kind of instrument of authorization, with respect to type of service and the territory sought to be served, a period of six months must elapse from and after the date of the commission's denial of the first application.

Provided, however, That the foregoing provisions shall have no application where, since the commission's denial of the first application, there has been a material change in the facilities available for designation to the particular service sought to be established in the territory sought to be served.

SEC. 9. **Applications pending appeal from decisions of the commission.**—Where an appeal has been taken from the action of the commission in denying a particular application, the commission will not consider or designate for hearing another application for the same kind of instrument of authorization, with respect to the type of service and territory sought to be served, filed by the same applicant, his successor or assignee, until the final disposition of such appeal, provided, however, that where, pursuant to section 7 of subtitle B, an application is granted in part and denied in part and the applicant desires to utilize the partial grant and to contest the partial denial, any such applicant shall be permitted during the pendency of such appeal, and without prejudice thereto, to file such application or applications as shall be necessary or requisite to the utilization, extension, or renewal, but not for a modification of the instrument in the particulars theretofore denied, and the commission will consider and dispose of these applications.

SEC. 10. **Application involving conflicting claims, etc.**—In fixing dates for hearings the secretary will, so far as possible, endeavor to fix the same date for hearings on all related matters which involve the same applicant and for hearings on all applications which by reason of the privileges, terms, or conditions requested present conflicting claims.

SEC. 11. **Depositions.**—In exceptional cases the commission may, either on its own motion or on written request by a party setting forth the facts which he expects to prove and the causes or reasons for the taking thereof, issue an order directing the time, place, and manner in which the testimony of a witness shall be taken by deposition. Such order shall be served upon all parties to the proceeding in which the deposition is to be used, and such deposition, when not otherwise directed, shall be taken, transcribed and executed in the usual manner before any officer having power to administer oaths. The time within which any such deposition shall be filed with the commission shall be fixed in the order directing the taking thereof.

SEC. 12. **Witnesses and subpœnas.**—Subpœnas may be issued by the commission or any member thereof or by an examiner appointed by the commission to compel the attendance of any witness at any hearing or at the taking of any deposition, or to compel the production of any document. Service of any such subpœna may be made by any United States marshal or by his deputy or by any citizen of the United States competent to be a witness. If service is made by a United States marshal or by his deputy, his service shall be evidenced by his return thereon; if made by any other person by his affidavit stating the manner in which service was made, which affidavit shall be attached to and returned with the original subpœna. Witnesses who attend any hearing or the taking of any deposition in answer to a subpœna are entitled to and shall receive the same fees and mileage as are paid for like services in the courts of the United States, such sum to be paid by the party at whose instance the testimony is taken.

SEC. 13. **Opening and closing.**—In each formal hearing held on an application for an instrument of authorization, the applicant shall have the opening and closing of the evidence and argument, if any. In each formal hearing held on an order of revocation the commission shall have the opening and closing. In cases where the foregoing rules are inapplicable under the issues to be presented, the commission or the person conducting the hearing may fix the order of procedure.

SEC. 14. **Amendments.**—Where no prejudice results to other parties, a party will be permitted to amend his application, answer, or other pleading at any time prior to the conclusion of hearing provided, however, that no amendment of an application for an instrument of authorization as to the frequency, power, hours of operation, equipment, location of station, or points of communication in case of stations other than broadcasting) will be permitted unless such amendment is filed with the commission not later than 20 days before the hearing date. In all cases where an amendment is made to any application contrary to the foregoing provisions, such amendment shall have the effect or setting aside the assignment for hearing and any such application so amended shall be treated in all respects as an application originally filed. In any case where an application is amended in the particulars above enumerated the secretary shall notify all parties affected thereby.

Subtitle C.—REVOCATION PROCEEDINGS

SECTION 1. **Revocation proceedings and the conduct thereof.**—Revocation proceedings under section 14 of the radio act shall be governed by the following procedure:

(*a*) Such proceedings shall in all cases be initiated by an order of revocation served upon or mailed by the commission to the holder of the license in question directing him to appear upon a date certain not less than 30 days after receipt of such notice and show cause why such order of revocation should not be made effective. This order of revocation shall be accompanied by a written statement of the cause for such proposed revocation.

(*b*) Either the respondent or any person in interest who would be aggrieved by any such revocation will be accorded an opportunity to appear and be heard in opposition to such order if, prior to the hearing date therein fixed, such respondent or other person shall deliver to the commission a written application therefor.

(*c*) Upon the filing of any such application the order of revocation shall stand suspended until the conclusion of the hearing herein provided for and the decision of the commission thereon; and the commission will forthwith fix the date for hearing and shall immediately mail a written notice of the time and place for such hearing to respondent and to all parties known to be interested in such license. The date fixed for hearing shall not be earlier than 30 days from the mailing of the notice thereof as herein provided.

(*d*) Not later than 20 days after date of mailing of the notices of hearing, respondent shall file with the commission an answer executed and sworn to by a person having knowledge of the facts, in which answer the allegations of the statement of cause for revocation shall be specifically and in detail denied or explained as the case may be. Any person other than the respondent may likewise file an answer within the same time and upon the same terms and conditions. Evidence to be introduced upon such hearing will be limited to the issues formed by the commission's statement of cause for revocation and the answers filed thereto, and in case no such answer is filed within the period herein fixed or such extension thereof as the commission may allow, an order of default will be entered, no hearing will be held, and an absolute order of revocation will be issued forthwith.

(*e*) After hearing has been held in accordance with the foregoing, the commission may affirm or revoke such order of revocation.

Subtitle D.—FORMAL HEARINGS AND THE CONDUCT THEREOF

SECTION 1. **Parties to hearings.**—All persons who are permitted to be heard in support of any application made by them shall be referred to as "applicants." All persons who are permitted to be heard in opposition to any application or licensees against whom revocation proceedings are instituted shall be referred to as "respondents." All persons, firms, companies, or corporations holding permits, licenses, or other instruments of authorization from the commission, or who have applications pending before the commission who would be aggrieved, or whose interests would be adversely affected by the granting of any application designated for hearing, shall constitute proper parties respondent and shall be notified of any such hearing.

SEC. 2. **Commission a party.**—The commission, represented by its general counsel or such assistants as he may designate, shall be a party to every formal hearing to the extent that in its judgment such participation is necessary to carry out the intent of the laws and treaties of the United States and of these regulations.

SEC. 3. **Intervention.**—Any governmental department or officer, any person, firm, company, or corporation, or any State or political subdivision thereof may, at any time, more than 10 days prior to the date of any hearing, file with the commission a petition to intervene therein in support of or in opposition to any application designated for hearing. If the petition discloses a substantial interest in the subject matter of the hearing the commission will grant the same and permit the petitioner to be heard at such hearing subject to regulations hereinafter imposed.

SEC. 4. **Taking of testimony and argument.**—In case of any formal hearing herein provided for the testimony may be taken before a quorum of the commission, before less than a quorum of the commission or before any examiner appointed by the commission in the discretion of the commission, as follows:

(*a*) In the event that the testimony is taken before the commission it may be followed by oral argument by the parties or by the filing of briefs, or both, at the discretion of the commission, and the case shall thereafter be decided by the commission on the basis of the testimony heard and the proceedings had.

(*b*) In the event that the testimony is taken before less than a quorum of the commission or before an examiner, the testimony, duly transcribed, shall be reported back to the commission by the person or persons conducting such hearing together with a written report containing recommendations as to the decision to be made thereon and the facts and grounds upon which such recommendation is based. A copy of such report shall be mailed by the commission to each party participating in the hearing, and such party or parties shall have the right, providing the same is exercised within a period of 15 days from the mailing of such report, to file exceptions to said report. Such exceptions shall point out with particularity the alleged error in said report and shall contain specific reference to the page or pages of the transcript of hearing or report referred to. In case any party filing an exception to a report desires oral argument thereon, he shall accompany the exceptions with a written request for such argument before a quorum of the commission and shall file therewith an affidavit stating that a copy of such exceptions and request for oral argument has been mailed to or served upon every other party participating in the hearing. Upon receipt of such request and affidavit, the commission may in its discretion fix a time for such oral argument to be held at its office in Washington, D. C., and give adequate notice to all parties participating in the hearing or it may consider and decide such matter without argument.

SEC. 5. **Continuances.**—Continuances of date of hearing, extensions of time for filing documents required to be filed, or for the taking of any other step in connection with any hearing, may be granted for reasons such as are usually considered sufficient for analogous continuances and extensions in the courts of the United States, providing, however, that request for such shall be made in writing setting forth the reasons therefor, and the additional time required, and provided, further, that such requests shall be made at a time and in such manner as to avoid unnecessary hardship or expense to other parties to the proceeding.

SEC. 6. **Briefs.**—Whenever consent is given to the filing of any briefs in connection with any hearing, 10 copies shall be filed with the commission within 20 days from the date on which hearing of testimony is concluded unless upon an affirmative showing the commission fixes a longer period. Each other party shall have 10 days from the filing of such brief within which to file an answer brief to any brief filed by such party. At or prior to the date fixed for filing any brief, the party filing the same shall serve or mail at least one copy thereof to every other party to the proceeding and no briefs will be accepted or considered by the commission unless accompanied by an affidavit to the effect that this requirement has been met.

Sec. 7. **Documents to be typewritten or printed.**—All pleadings, briefs, or other documents filed in connection with any hearing shall be printed or typewritten with such type and on such quality of paper as shall be easily legible. The commission reserves the right to refuse to receive or consider any document that does not meet this requirement.

Sec. 8. **Evidence.**—Except as hereinafter stated the rules of evidence governing civil proceedings in the courts of the United States shall govern formal hearings before the commission, any commissioner or examiner, provided, however, that the commission reserves the right to relax such rules in any case where in its judgment the ends of justice will be better served by so doing.

(*a*) In any hearing on an application for an instrument of authorization the following records of the commission shall be considered as a part of the record without special request or offer by any party unless otherwise stated in the transcript;

(1) A list of all stations, together with their authorized power, frequency, and hours of operation, licensed in the band of frequencies[1] in which authorization to operate is sought;

(2) A list of all applications pending at the date of said hearing with respect to any station seeking to operate in said band;[1]

(3) Such of the commission's published rules, regulations and general orders as have to do with the band of frequencies in question and with the services permitted in such band.[1]

(*b*) Copies of reports of any governmental department or agency made by an employee thereof in the course of his duties in so far as they are material shall be admissible in evidence without further authentication than a statement from the proper custodian of any such record or from the person compiling the same that the copy in question is a true copy of such record and that the record is what it purports to be.

(*c*) Where relevant and material matter offered in evidence is embraced in a document containing other matter not material or relevant and not intended to be put in evidence, such document will not be received but the party offering the same shall present to opposing counsel and to the commission the original document together with true copies of such material and relevant matter taken therefrom as it is desired to introduce. Upon presentation of such matter in proper form it may be received in evidence and become a part of the record, provided, however, that opposing counsel shall be afforded an opportunity to introduce in evidence, in like manner, other portions of such document if found to be material and relevant.

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[1] "Band" or "band of frequencies" as used herein shall be taken as referring to the major bands, namely, low (10 to 100 kilocycles), medium (100 to 550 kilocycles), broadcast (550 to 1,500 kilocycles), medium high (1,500 to 6,000 kilocycles), high (6,000 to 30,000 kilocycles), and very high (above 30,000 kilocycles).

(*d*) Except as herein otherwise expressly provided no document or exhibit or a part thereof shall be received as or admitted in evidence unless the offer in evidence is accompanied by a tender of the original and a full, true, and correct copy or a full, true, and correct copy of such document or exhibit in duplicate.

(*e*) Except as herein expressly stated, unsworn documents and oral declarations will not be received in evidence.

(*f*) The introduction of merely cumulative evidence shall be avoided and the commission reserves the right to limit the number of witnessess that may be heard in behalf of a party on any issue.

(*g*) Any party desiring to present his case in whole or in part by affidavit may do so by adhering to the following procedure:

(1) Affidavits must be limited to material facts personally known to affiants and must not contain expressions of opinion, argument, or conclusions;

(2) Only the affidavits of parties and their respective agents and employees will be received;

(3) Copies of all affidavits intended to be used in any hearing must be served upon or mailed to the commission and all parties notified of the hearing not less than 15 days prior to the hearing date and no affidavits will be received or considered by the commission unless accompanied by a further affidavit by the party, his agent or attorney, stating that this requirement has been met;

(4) Any party to a hearing may, upon the receipt of a copy of an affidavit from any other party, as provided in the foregoing subparagraph (3), prepare and file counteraffidavits which shall be limited in their scope to an explanation or denial of the facts alleged in the affidavits to which they relate.

Subtitle E.—INFORMAL HEARINGS AND THE CONDUCT THEREOF

SECTION 1. **Method of obtaining and procedure.**—The commission may upon petition by any person or upon its own motion hold such informal hearings as it may deem necessary from time to time in connection with the investigation of any matter which it has power to investigate under the law, or for the purpose of obtaining information necessary or helpful in the determination of its policies, the carrying out of its duties, or the formulation or amendment of its rules and regulations. For such purposes it may summon witnesses and require the production of testimony as in formal hearings but the procedure to be followed shall be informal and such as in the opinion of the commission will best serve the purposes of such hearing.

Subtitle F.—PREPARATION OF RECORD ON APPEAL

SECTION 1. **Preparation and stipulation by general counsel.**—Where an appeal is taken from a decision of the commission to the Court of Appeals of the District of Columbia or to a district court in the United States, the record required to be filed in such court by section 16 of the radio act of 1927 shall be prepared under the supervision of the general counsel of the commission and shall be certified by the secretary of the commission. The general counsel shall have power to stipulate with the appellant to such extent as may be necessary to omit unnecessary matter from the record provided that the interests of neither the commission nor of any other party to the record is adversely affected by such omission.

SEC. 2. **Stipulation between parties.**—Where the case has been in its essential nature a controversy between two or more parties and no interest of the commission or of the public is involved, the general counsel will observe and give effect to any stipulation entered into between the parties as to what matters shall or shall not be included in the record.

Subtitle G.—GENERAL ORDERS

SECTION 1. **Scope, promulgation, and effective date.**—Such action by the commission as affects a large number of persons and does not arise out of a formal hearing, such as the enactment of further regulations or as an amendment to these regulations, shall be taken by general order which shall be promptly promulgated by the secretary, shall be numbered serially and shall bear both the date of adoption and the effective date.

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229 Federal Radio Commission, Washington, D. C.

General Order No. 40.

August 30, 1928.

At a session of the Federal Radio Commission held at its office in Washington, D. C., on August 30, 1928.

The Commission has determined that the definite assignment of a band of frequencies for broadcasting, the maintenance of a separation of 10 kc between frequencies used in broadcasting, the reservation of certain frequencies for exclusive use by stations in the Dominion of Canada, and the setting aside of a certain number of other frequencies for shared use by the United States and the Dominion of Canada, all as hereinafter specified in this Order, will serve public interest, convenience or necessity.

The Commission has further determined after careful consideration that the allocation of frequencies, of time for operation and of station power, for use by broadcasting stations, to the respective Zones, as hereinbelow specified in this Order:

a) Is necessary in order to comply in part with the requirements of Section 9 of the Radio Act of 1927 as amended by Section 5 of the Act of Congress March 28, 1928, insofar as it requires that the licensing authority shall as nearly as possible make and maintain an equal allocation of bands of frequency or wavelengths, of
230 periods of time for operation, and of station power, to each of the Zones when and insofar as there are applications therefor, and

b) Will promote public interest and convenience and will serve public necessity, insofar as this can be done in a manner consistent with the requirements of said Section 9 of the Radio Act of 1927 as amended by Section 5 of the Act of Congress, March 28, 1928, and will greatly improve reception conditions in the broadcast band by the elimination of a large portion of the interference which now exists.

It is therefore ordered:

Paragraph 1. That a band of frequencies extending from 550 kc. to 1500 kc., both inclusive, be, and the same is hereby, assigned to and for the use of broadcasting stations, said band of frequencies being hereinafter referred to as the broadcast band. This order is not to be construed as prohibiting the licensing of maritime mobile services on the frequency of 1365 kc., as provided by the International Radio telegraph Convention of 1927.

Paragraph 2. That within said broadcast band, a separation of 10 kc. be maintained between the frequencies assigned for use by broadcasting stations.

Paragraph 3. That, of the frequencies within said broadcast band, (a) the frequencies of 690, 730, 840, 910, 231 960 and 1030 kc. be, and the same are, hereby reserved for use by broadcasting stations located in the Dominion of Canada, and shall not be assigned to any broadcasting station licensed by this Commission: (b) the frequencies of 580, 600, 630, 780, 880, 890, 930, 1010, 1120, 1200 and 1210 kc. be, and the same are hereby, set aside for simultaneous use by broadcasting stations located both in the Dominion of Canada and in the United States, its Territories and possessions, and no station will be authorized by this Commission on any of these frequencies with an authorized power which will cause interference at the boundary line between the Dominion of Canada and the United States of America, or in excess of 500 watts at any place within the United States of America or the Territories of Alaska and Porto Rico.

Paragraph 4. That the frequencies within said broadcast band (subject to the foregoing), and periods of time for operation and station power to be used by broadcasting stations on said frequencies be, and the same are hereby, allocated equally to the Zones as follows:

A. The following frequencies are allocated to the First, Second, Third, Fourth and Fifth Zones, respectively, as below indicated for use by broadcasting stations, the amount of power to be used by such stations to be determined by further order of the Commission:

232 First Zone: 660, 710, 760, 860, 990, 1060, 1100, and 1150 kc.

Second Zone: 700, 750, 820, 900, 1020, 1070, 1110, and 1170 kc.

Third Zone: 650, 740, 800, 850, 1040, 1080, 1140 and 1190 kc.

Fourth Zone: 670, 720, 770, 810, 870, 1000, 1090, and 1160 kc.

Fifth Zone: 640, 680, 790, 830, 970, 1050, 1130 and 1180 kc.

B. The following frequencies are allocated each for use by not less than two Zones, with broadcasting stations in these Zones being permitted to operate silultaneously, each station to have an authorized power not to exceed 5 kilowatts, the particular Zone entitled to share in the allocation of any particular frequency to be determined by further order of the Commission: 1460, 1470, 1480 and 1490 kc.

C. The following frequencies are allocated for use by not less than two nor more than three Zones, the broadcasting stations in those Zones being permitted to operate simultaneously, and to have an authorized power not to exceed 1000 watts, the particular Zones entitled to share in the allocation of any particular frequency to be determined by further order of the Commission: 580, 590, 600, 610, 620,
630, 780, 880, 890, 900, 920, 930, 940, 950, 1010, 1120,
233 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300,
1320, 1330, 1340, 1350, 1360, 1380, 1390, 1400, 1410
and 1430 kc.

(Except that in those cases where the station locations and powers are such that interference will not be caused, four or five Zones instead of three Zones may share one or more of the foregoing frequencies where practicable.)

D. The following frequencies are allocated for use in all five Zones with broadcasting stations permitted to operate simultaneously, each station to have an authorized power not to exceed 1000 watts: 550, 560, 570, 1440 and 1450 kc.

E. The following frequencies are allocated for use in all five Zones by broadcasting stations in simultaneous operation with an authorized power not to exceed 100 watts, the number of such stations to be permitted to operate simultaneously in each Zone on each of said frequencies to be determined by further order of the Commission: 1200, 1210, 1310, 1370, 1420, and 1500 kc.

F. Whenever the word "frequency" is used in the preceding sub-paragraphs A, B, C, D, and E of this paragraph, it is to be understood as connecting periods of full-time operation, that is to say, twenty-four hours daily, and

every allocation herein of a frequency to a par-
234 ticular Zone is to be considered as carrying with it
an assignment of full-time operation on that frequency to that Zone.

Paragraph 5. That the allocation hereinbefore ordered in paragraph 4 of this Order be, and the same is hereby declared to be, effective on October 1, 1928, at the hour of 3 o'clock a. m., Eastern Standard Time; and that the provisions of paragraphs 1, 2 and 3, be, and the same are hereby declared to be, effective as of the date of the issuance of this Order.

FEDERAL RADIO COMMISSION,
By E. O. SYKES,
Acting Chairman.

BROADCASTING RADIO STATIONS

OF THE

UNITED STATES

~~~

Edition February 2, 1931

UNITED STATES OF AMERICA
FEDERAL RADIO COMMISSION
WASHINGTON, D. C.
~~~

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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1931

For sale by the Superintendent of Documents, Washington, D. C. - - - - Price 15 cents
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ABBREVIATIONS

C. P.—Construction permit authorized.
D.—Daytime. See General Order No. 41.
LP.—Limited power. See General Order No. 42.
LS.—Power until local sunset.
LT.—Limited time. See General Order No. 48.
T.—Where transmitter location differs from main studio, same is shown below main studio location.
W.—Watts.
KW.—Kilowatts.

GENERAL ORDER NO. 41

Federal Radio Commission,
Washington, D. C.

At a session of the Federal Radio Commission held at its office in Washington, D. C., on September 4, 1928—

It is ordered that a daytime broadcasting station is hereby defined as a station which under its license from this commission is permitted to operate only during certain designated hours during the daytime and is not permitted to operate at any time when its operation will cause heterodyne interference with other broadcasting stations assigned to the same frequency.

No daytime station will be permitted to operate after the average time for sunset during any particular month, to be determined from time to time by the chief engineer of the commission. The time of such sunset shall be taken with reference to the location of the transmitter of the daytime broadcasting station unless it is the farthest east of the stations assigned to the same frequency; in this event the time shall be taken with reference to the location of the transmitter of the nearest broadcasting station on the same frequency located to the west of such daytime broadcasting station.

[SEAL.]
Federal Radio Commission,
By E. O. Sykes,
Acting Chairman.

GENERAL ORDER NO. 42 AS AMENDED

Federal Radio Commission,
Washington, D. C.

At a session of the Federal Radio Commission held at its office in Washington, D. C., on June 16, 1930—

It is ordered:

1. That, except as hereinafter stated, no broadcasting station assigned to any of the frequencies set forth in subparagraph A of paragraph 4 of General Order No. 40 be authorized to use in excess of 25 kilowatts until further order of the commission.

2. That, until further order of the commission, not more than 4 of such frequencies from each zone shall be assigned for use of stations operating with 25 kilowatts regular and 25 kilowatts experimental power.

3. That, for experimental purposes, the commission may authorize the use of any amount of power in excess of 50 kilowatts, in

equal amounts for each zone, by such broadcasting stations at such hours between midnight and morning as may be determined by the commission.

4. That, the commission may authorize the use of an amount of power not in excess of twice that above set forth in paragraphs 1 and 2, by the broadcasting stations therein referred to, respectively, for daytime operation only, the exact hours to be determined by the commission.

5. That, nothing stated in this order shall be construed as giving any broadcasting station any right or claim to any of the maximum amounts of power hereinabove set forth, or to any amount of power in excess of the amount which the commission shall from time to time in each case find best calculated to serve public interest, convenience or necessity.

FEDERAL RADIO COMMISSION,
By C. McK. SALTZMAN,
Chairman.

GENERAL ORDER NO. 48

FEDERAL RADIO COMMISSION,
WASHINGTON, D. C., *October 24, 1928.*

At a session of the Federal Radio Commission held at its offices in Washington, D. C., on October 22, 1928—

A limited time broadcasting station is hereby defined as a station which, under its license from this commission, is permitted to operate during hours allowed daytime broadcasting stations as specified in General Order No. 41, and in addition during certain time temporarily not used by the unrestricted station or stations on the same frequency. An example is the use of late evening hours by a limited time broadcasting station in the West after the closing of an eastern station on the same frequency.

A limited time broadcasting station desiring to operate after sunset shall so notify the commission, which will ascertain what hours the use of which is not desired by the unrestricted station or stations on the same frequency, and will thereafter authorize the operation of the limited time station accordingly, subject, however, to the right of said unrestricted station or stations to reclaim the use of such hours upon reasonable notice to the commission and to the limited time broadcasting station.

A limited time broadcasting station will not be permitted to operate at any time when its operation will cause heterodyne interference with other broadcasting stations assigned to the same frequency.

FEDERAL RADIO COMMISSION,
[SEAL.] By IRA E. ROBINSON,
Chairman.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WAAF	Chicago, Ill	Drovers Journal Publishing Co	500W	920	Daytime.
WAAM	Newark, N. J	WAAM (Inc.)	1KW 2KW-LS[1]	1250	Shares with WGCP and WODA.
WAAT	Jersey City, N. J	Bremer Broadcasting Corporation	300W	940	Daytime until 6 p. m. eastern standard time.
WAAW	Omaha, Nebr	Omaha Grain Exchange	500W	660	Daytime.
WABC-WBOQ	New York, N. Y. T-W. of Cross Bay Boulevard, Queens County, N. Y.[2]	Atlantic Broadcasting Corporation.	5KW	860	Unlimited.
WABI	Bangor, Me	Pine Tree Broadcasting Corporation.	100W	1200	Do.
WABO-WHEC	See WHEC-WABO.				
WABZ	New Orleans, La	Coliseum Place Baptist Church	100W	1200	Shares with WJBW.
WACO	Waco, Tex	Central Texas Broadcasting Co. (Inc.)	1KW	1240	Shares with KTAT.
WADC	Tallmadge, Ohio	Allen T. Simmons	1KW	1320	Unlimited.
WAIU	Columbus, Ohio	American Insurance Union	500W	640	Limited time.
WALR	Zanesville, Ohio	Roy W. Waller	100W	1210	Unlimited.
WAPI	Birmingham, Ala	Alabama Polytechnic Institute, University of Alabama, and Alabama College.	5KW	1140	Shares with KVOO.
WASH	Grand Rapids, Mich	WASH Broadcasting Corporation	500W	1270	Shares with WOOD.
WAWZ	Zarephath, N. J	Pillar of Fire	250W	1350	Shares with WCDA, WMSG, and WBNX. C. P. only.
WBAA	West Lafayette, Ind	Purdue University	500W 1KW-LS	1400	Shares with WCMA and WKBF.
WBAK	Harrisburg, Pa	Pennsylvania State Police, Commonwealth of Pennsylvania.	500W 1KW-LS	1430	Shares with WHP and WCAH.
WBAL	Baltimore, Md. T—Glen Morris.	Consolidated Gas Electric Light & Power Co. of Baltimore.	10KW	1060	Shares with WTIC.

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[1] C. P. to increase power to 2½KW-LS.
[2] C. P. to move transmitter to Wayne, N. J., and increase power to 50KW-LP.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilo-cycles	Time of operation
WBAP	Fort Worth, Tex	Carter Publications (Inc.)	50KW-LP[3]	800	Shares with WFAA.
WBAX	Wilkes-Barre, Pa. T—Plains Township.	John H. Stenger, jr	100W	1210	Shares with WJBU.
WBBC	Brooklyn, N. Y	Brooklyn Broadcasting Corporation.	500W	1400	Shares with WFOX, WCGU, and WLTH.
WBBL	Richmond, Va	Grace Covenant Presbyterian Church.	100W	1210	Certain hours Sundays only.
WBBM-WJBT	Chicago, Ill. T—Glenview, Ill.	Atlass Company (Inc.)	25KW	770	Shares with KFAB.
WBBR	Brooklyn, N. Y. T—Rossville, N. Y.	People's Pulpit Association	1KW	1300	Shares with WHAZ, WHAP, and WEVD.
WBBZ	Ponca City, Okla	C. L. Carrell	100W	1200	Unlimited.
WBCM	Bay City, Mich. T—Hampton Township.	James E. Davidson	500W	1410	Do.
WBEN	Buffalo, N. Y. T—Martinsville.	Edw. H. Butler, trustee for Ada Butler Mitchell, and Edw. H. Butler, trading as Buffalo Evening News.	1KW	900	Do.
WBEO	Marquette, Mich	Charles C. MacLeod	100W	1310	Unlimited. C. P. only.
WBGF	Glens Falls, N. Y	W. Neal Parker and Herbert H. Metcalfe.	50W	1370	Unlimited.
WBIG	Greensboro, N. C	North Carolina Broadcasting Co. (Inc.).	500W	1440	Do.
WBIS-WNAC	See WNAC-WBIS				
WBMS	Hackensack, N. J	WBMS Broadcasting Corporation	250W	1450	Shares with WNJ, WKBO, and WHOM.
WBNX	New York, N. Y	Standard Cahill Co. (Inc.)	250W	1350	Shares with WAWZ, WMSG, and WCDA.
WBOQ-WABC	See WABC-WBOQ.				
WBOW	Terre Haute, Ind	Banks of Wabash (Inc.)	100W	1310	Unlimited.
WBRC	Birmingham, Ala	Birmingham Broadcasting Co. (Inc.)	500W 1KW-LS	930	Do.

WBRE	Wilkes-Barre, Pa	Louis G. Baltimore	100W	1310	Do.
WBSO	Needham, Mass	Babson's Statistical Organization (Inc.).	500W	920	Daytime.
WBT	Charlotte, N. C	Station WBT (Inc.)	5KW	1080	Unlimited.
WBTM	Danville, Va	L. H., R. G., & A. S. Clarke, doing business as Clarke Electric Co.	100W	1370	Shares with WLVA.
WBZ	Springfield, Mass. T-E. Springfield.[4]	Westinghouse Electric & Manufacturing Co.	15KW	990	Shares with WBZA.
WBZA	Boston, Mass.[5]	do	500W	990	Shares with WBZ.
WCAC	Storrs, Conn	Connecticut Agricultural College	250W	600	Shares with WGBS.
WCAD	Canton, N. Y	St. Lawrence University	500W	1220	Daytime.
WCAE	Pittsburgh, Pa	Kaufman & Baer Co	1KW	1220	Unlimited.
WCAH	Columbus, Ohio	Commercial Radio Service Co	500W	1430	Shares with WHP and WBAK.
WCAJ	Lincoln, Nebr.[6]	Nebraska Wesleyan University	500W	590	Shares with WOW.
WCAL	Northfield, Minn	St. Olaf College	1KW	1250	Shares with KFMX, WRHM, and WLB.
WCAM	Camden, N. J	City of Camden	500W	1280	Shares with WOAX and WCAP.
WCAO	Baltimore, Md	Monumental Radio (Inc.)	250W	600	Unlimited.
WCAP	Asbury Park, N. J	Radio Industries Broadcast Co	500W	1280	Shares with WCAM and WOAX.
WCAT	Rapid City, S. Dak	South Dakota State School of Mines	100W	1200	Unlimited.
WCAU	Philadelphia, Pa. T—Byberry, Pa.	Universal Broadcasting Co	10KW	1170	Do.
WCAX	Burlington, Vt	University of Vermont	100W	1200	Shares with WNBX.
WCAZ	Carthage, Ill	Superior Broadcasting Service (Inc.).	50W	1070	Daytime.
WCBA	Allentown, Pa	B. Bryan Musselman	250W	1440	Shares with WSAN.
WCBD	Zion, Ill	Wilbur Glenn Voliva	5KW	1080	Limited. Shares with WMBI.
WCBM	Baltimore, Md	Baltimore Broadcasting Corporation.	100W 250W-LS	1370	Unlimited.
WCBS	Springfield, Ill	Charles H. Messter and Harold L. Dewing.	100W	1210	Shares with WTAX.
WCCO	Minneapolis, Minn. T—Anoka, Minn.	Northwestern Broadcasting (Inc.)	7½KW	810	Unlimited.

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[3] Licensed at present for 10 kw. only.
[4] C. P. to move transmitter to Millis Township, Mass., studio to Boston, Mass., and consolidate with WBZA.
[5] C. P. to move transmitter to East Springfield and increase power to 1 KW.
[6] C. P. to decrease power to 250 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS--Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WCDA	New York, N. Y. T—Cliffside Park, N. J.	Italian Educational Broadcasting Co. (Inc.).	250W	1350	Shares with WAWZ, WBNX, and WMSG.
WCFL	Chicago, Ill	Chicago Federation of Labor	1½KW	970	Limited.
WCGU	Brooklyn, N. Y	United States Broadcasting Corporation.	500W	1400	Shares with WFOX, WLTH, and WBBC.
WCHI	Chicago, Ill. T—Batavia, Ill.	People's Pulpit Association	5KW	1490	Shares with WJAZ and WCKY.
WCKY	Covington, Ky. T—Crescent Springs, Ky.	L. B. Wilson (Inc.)	5KW	1490	Shares with WJAZ and WCHI.
WCLB	Brooklyn, N. Y	Arthur Faske	100W	1500	Shares with WWRL, WLBX, and WMBQ. C. P. only.
WCLO	Janesville, Wis	WCLO Radio Corporation	100W	1200	Unlimited.
WCLS	Joliet, Ill	WCLS (Inc.)	100W	1310	Shares with WKBB.
WCMA	Culver, Ind	General Broadcasting Corporation	500W	1400	Shares with WKBF and WBAA.
WCOA	Pensacola, Fla	City of Pensacola, Fla	500W	1340	Unlimited.
WCOC	Meridian, Miss	Mississippi Broadcasting Co. (Inc.)	500W 1KW-LS	880	Do.
WCOD	Harrisburg, Pa	Keystone Broadcasting Corporation.	100W	1200	Shares with WKJC.
WCOH	Yonkers, N. Y. T—Greenville, N. Y.	Westchester Broadcasting Corporation.	100W	1210	Shares with WJBI, WGBB, and WMRJ.
WCRW	Chicago, Ill	Clinton R. White	100W	1210	Shares with WSBC and WEDC.
WCSC	Charleston, S. C	Fred Jordan & Lewis Burk	500W	1360	Unlimited.
WCSH	Portland, Me. T—Scarboro, Me.	Congress Square Hotel Co	1KW	940	Do.
WDAE	Tampa, Fla	Tampa Publishing Co	1KW	1220	Do.
WDAF	Kansas City, Mo	Kansas City Star Co	1KW	610	Do.
WDAG	Amarillo, Tex	National Radio and Broadcasting Corporation.	250W[7]	1410	Shares with KGRS.
WDAH	El Paso, Tex	E. E., C. T., E. M., and Ernest Wilson, doing business as Eagle Broadcasting Co.	100W	1310	Shares with KTSM.

WDAY	Fargo, N. Dak. T—W. Fargo, N. Dak.	WDAY (Inc.)	1KW	940	Unlimited.
WDBJ	Roanoke, Va	Richardson-Wayland Electrical Corporation.	250W 500W-LS	930	Do.
WDBO	Orlando, Fla	Orlando Broadcasting Co. (Inc.)	500W 1KW-LS	1120	One-half time.
WDEL	Wilmington, Del	WDEL (Inc.)	250W 350W-LS [8]	1120	Unlimited.
WDGY	Minneapolis, Minn	Dr. George W. Young	1KW	1180	Limited. Shares with WHDI.
WDIX	Tupelo, Miss	North Mississippi Broadcasting Corporation.	100W	1500	Unlimited.
WDOD	Chattanooga, Tenn. T—Brainerd, Tenn.	WDOD Broadcasting Co	1KW 2½KW-LS	1280	Do.
WDRC	Hartford, Conn. T—Bloomfield, Conn.	Doolittle Radio Corporation	500W	1330	Do.
WDSU	New Orleans, La. T—Gretna, La.	Joseph H. Uhalt	1KW	1250	Do.
WDWF-WLSI	Providence, R. I. T—Cranston, R. I.	Dutee Wilcox Flint and Lincoln Studios (Inc.).	100W	1210	Shares with WPAW.
WDZ	Tuscola, Ill	James L. Bush	100W	1070	Daytime.
WEAF	New York, N. Y. T—Bellmore, N. Y.	National Broadcasting Co. (Inc.)	50KW-LP	660	Unlimited.
WEAI	Ithaca, N. Y	Cornell University	1KW	1270	Daytime.
WEAN	Providence, R. I	Shepard Broadcasting Service (Inc.)	250W 500W-LS	780	Unlimited.
WEAO	Columbus, Ohio	Ohio State University	750W	570	Shares with WKBN.
WEBC	Superior, Wis	Head of the Lakes Broadcasting Co	1KW 2½KW-LS	1290	Unlimited.
WEBQ	Harrisburg, Ill	First Trust & Savings Bank of Harrisburg, Ill.	100W	1210	Shares with KFVS.
WEBR	Buffalo, N. Y	Howell Broadcasting Co. (Inc.)	100W 200W-LS	1310	Unlimited.
WEDC	Chicago, Ill	Emil Denemark (Inc.)	100W	1210	Shares with WCRW and WSBC.
WEDH	Erie, Pa	Erie Dispatch-Herald Broadcasting Corporation.	100W	1420	Unlimited.
WEEI	Boston, Mass. T—Weymouth, Mass.	Edison Electric Illuminating Co. of Boston.	1KW	590	Do.

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[7] C. P. to increase power to 1KW.

[8] C. P. to increase power to 500W-LS.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WEHC	Emory, Va	Emory & Henry College	100W 250W–LS	1200	Unlimited.
WEHS	Evanston, Ill	WEHS (Inc.)	100W	1420	Shares with WKBI and WHFC.
WELK	Philadelphia, Pa	WELK Broadcasting Station (Inc.)	100W 250W–LS	1370	Unlimited.
WELL	Battle Creek, Mich	Enquirer-News Co	50W[9]	1420	Do.
WENR–WBCN	Chicago, Ill. T—Downers Grove, Ill.	Great Lakes Broadcasting Co	50KW–LP	870	Shares with WLS.
WEPS–WORC	See WORC–WEPS.				
WEVD	New York, N. Y. T—Forest Hills, N. Y.	Debs Memorial Radio Fund (Inc.)	500W	1300	Shares with WBBR, WHAP, and WHAZ.
WEW	St. Louis, Mo	St. Louis University	1KW	760	Daytime.
WEXL	Royal Oak, Mich	Royal Oak Broadcasting Co	50W	1310	Unlimited.
WFAA	Dallas, Tex. T—Grapevine, Tex.	The Dallas News and Dallas Journal (A. H. Belo Corporation).	50KW–LP	800	Shares with WBAP.
WFAN	Philadelphia, Pa	Keystone Broadcasting Co	500W	610	Shares with WIP.
WFBC	Knoxville, Tenn	First Baptist Church	50W	1200	Unlimited.
WFBE	Cincinnati, Ohio	Radio Station WFBE (Inc.)	100W 250W–LS	1200	Do.
WFBG	Altoona, Pa	Wm. F. Gable Co	100W[10]	1310	Shares with WJAC.
WFBL	Syracuse, N. Y.[11]	Onondaga Radio Broadcasting Corporation.	1KW	1360	Unlimited.
WFBM	Indianapolis, Ind	Indianapolis Power and Light Co	1KW	1230	Shares with WSBT.
WFBR	Baltimore, Md	Baltimore Radio Show (Inc.)	500W	1270	Unlimited.
WFDF	Flint, Mich	Frank D. Fallain	100W	1310	Do.
WFDV	Rome, Ga	Dolies Goings	100W	1370	Do.
WFDW	Talledega, Ala	Raymond C. Hammett	100W	1420	Do.
WFI	Philadelphia, Pa	Strawbridge & Clothier	500W	560	Shares with WLIT.
WFIW	Hopkinsville, Ky	WFIW (Inc.)	1KW	940	Unlimited.
WFLA–WSUN	Clearwater, Fla	Clearwater Chamber of Commerce and St. Petersburg Chamber of Commerce.	1KW 2½KW–LS	620	Do.

WFOX	Brooklyn, N. Y	Paramount Broadcasting Corporation.	500W	1400	Shares with WCGU, WLTH, and WBBC.
WGAL	Lancaster, Pa	WGAL (Inc.)	100W	1310	Shares with WRAW.
WGAR	Cleveland, Ohio	The WGAR Broadcasting Co	500W	1450	Unlimited.
WGBB	Freeport, N. Y	Harry H. Carman	100W	1210	Shares with WJBI, WCOH, and WMRJ.
WGBC	Memphis, Tenn	Memphis Broadcasting Co	500W	1430	Shares with WNBR.
WGBF	Evansville, Ind	Evansville on the Air (Inc.)	500W	630	Shares with WOS and KFRU.
WGBI	Scranton, Pa	Scranton Broadcasters (Inc.)	250W	880	Shares with WQAN.
WGBS	New York, N. Y. T—Astoria, Long Island, N. Y.	General Broadcasting System (Inc.)	250W 500W-LS[12]	600	Shares with WCAC.
WGCM	Gulfport, Miss. T—Mississippi City, Miss.	Great Southern Land Co	100W	1210	Unlimited.
WGCP	Newark, N. J	May Radio Broadcast Corporation.	250W	1250	Shares with WODA and WAAM.
WGES	Chicago, Ill	Oak Leaves Broadcasting Station (Inc.).	500W 1KW-LS[13]	1360	Shares with WJKS.
WGH	Newport News, Va	Hampton Roads Broadcasting Corporation.	100W	1310	Unlimited.
WGL	Fort Wayne, Ind	Fred C. Zieg (Allen-Wayne Co.)	100W	1370	Do.
WGMS-WLB	See WLB-WGMS.				
WGN-WLIB	Chicago, Ill. T—Elgin, Ill.	The Tribune Co	25KW	720	Do.
WGR	Buffalo, N. Y. T—Amherst, N. Y.	Buffalo Broadcasting Corporation	1KW	550	Do.
WGST	Atlanta, Ga	Georgia School of Technology	250W 500W-LS	890	Shares with WMAZ.
WGY	Schenectady, N. Y. T—South Schenectady, N. Y.	General Electric Co	50KW	790	Unlimited.
WHA	Madison, Wis	University of Wisconsin	750W	940	Daytime.
WHAD	Milwaukee, Wis	Marquette University	250W	1120	Shares with WISN.
WHAM	Rochester, N. Y. T—Victor Township, N. Y.	Stromberg-Carlson Telephone Manufacturing Co.	5KW	1150	Unlimited.

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[9] C. P. to increase power to 100 watts.
[10] C. P. to increase power to 250 watts LS.
[11] C. P. to move transmitter to Collamer, N. Y., and increase power to 2½ KW-LS.
[12] Experimentally.
[13] On Sunday experimentally.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WHAP	New York, N. Y. T—Carlstadt, N. J.	Defenders of Truth Society (Inc.)	1KW	1300	Shares with WBBR, WEVD, and WHAZ.
WHAS	Louisville, Ky. T—Jeffersontown, Ky.	The Courier-Journal Co. and the Louisville Times Co.	10KW	820	Unlimited.
WHAT	Philadelphia, Pa	Independence Broadcasting Co	100W	1310	Shares with WTEL.
WHAZ	Troy, N. Y	Rensselaer Polytechnic Institute	500W	1300	Shares with WBBR, WHAP, and WEVD.
WHB	Kansas City, Mo. T—North Kansas City, Mo.	WHB Broadcasting Co	500W	860	Daytime.
WHBC	Canton, Ohio	St. John's Catholic Church	10W	1200	Shares with WNBO on Sundays.
WHBD	Mount Orab, Ohio	F. P. Moler	100W	1370	Unlimited.
WHBF	Rock Island, Ill	Beardsley Specialty Co	100W	1210	Do.
WHBL	Sheboygan, Wis	Press Publishing Co	500W	1410	Shares with KFLV.
WHBQ	Memphis, Tenn	Broadcasting Station WHBQ (Inc.)	100W	1370	Unlimited.
WHBU	Anderson, Ind	Citizens Bank	100W	1210	Do.
WHBY	Green Bay, Wis. T—West De Pere, Wis.	St. Norbert College	100W	1200	Do.
WHDF	Calumet, Mich	Upper Michigan Broadcasting Co	100W 250W–LS	1370	Do.
WHDH	Boston, Mass. T—Gloucester, Mass.	Matheson Radio Co. (Inc.)	1KW	830	Daytime until sunset at Denver, Colo.
WHDI	Minneapolis, Minn	William Hood Dunwoody Industrial Institute.	500W	1180	Limited. Shares with WDGY.
WHDL	Tupper Lake, N. Y	Tupper Lake Broadcasting Co. (Inc.).	10W[14]	1420	Daytime.
WHEC–WABO	Rochester, N. Y	Hickson Electric & Radio Corporation.	500W	1440	Shares with WOKO.
WHFC	Cicero, Ill	Triangle Broadcasters	100W	1420	Shares with WKBI and WEHS
WHIS	Bluefield, W. Va	Daily Telegraph Printing Co	100W[15]	1420	Unlimited.

WHK	Cleveland, Ohio. T—Seven Hills, Ohio.	Radio Air Service Corporation	1KW	1390	Do.
WHN	New York, N. Y	Marcus Loew Booking Agency	250W	1010	Shares with WRNY and WQAO–WPAP.
WHO	Des Moines, Iowa	Central Broadcasting Co	5KW	1000	Synchronizes with WOC experimentally.
WHOM	Jersey City, N. J	New Jersey Broadcasting Corporation.	250W	1450	Shares with WBMS, WKBO, and WNJ.
WHP	Harrisburg, Pa. T—Lemoyne, Pa.	WHP (Inc.)	500W 1KW–LS	1430	Shares with WBAK and WCAH.
WIAS	Ottumwa, Iowa	Iowa Broadcasting Co	100W	1420	Unlimited.
WIBA	Madison, Wis	The Capital Times Co	500W	1280	Do.
WIBG	Elkins Park, Pa	St. Pauls Protestant Episcopal Church.	50W	930	Daytime.
WIBM	Jackson, Mich	WIBM (Inc.)	100W	1370	Shares with WJBK.
WIBO	Chicago, Ill. T—Des Plaines, Ill.	Nelson Bros. Bond & Mortgage Co.	1KW 1½KW–LS	560	Shares with WPCC and WISJ.[16]
WIBR	Steubenville, Ohio	George W. Robinson	50W	1420	One-half time.
WIBU	Poynette, Wis	Wm. C. Forrest	100W	1210	Unlimited.
WIBW	Topeka, Kans	Topeka Broadcasting Association (Inc.).	1KW [17]	580	Shares with KSAC.
WIBX	Utica, N. Y	WIBX (Inc.)	100W 300W–LS	1200	Unlimited.
WICC	Bridgeport, Conn. T—Easton, Conn.	Bridgeport Broadcasting Station (Inc.).	500W	1190	Daytime.
WIL	St. Louis, Mo	Missouri Broadcasting Corporation.	100W 250W–LS	1200	Shares with KFWF.
WILL	Urbana, Ill	University of Illinois	250W 500W–LS	890	Shares with KFNF and KUSD.
WILM	Wilmington, Del. T—Edge Moor, Del.	Delaware Broadcasting Co. (Inc.)	100W	1420	Unlimited.
WIOD–WMBF	Miami, Fla. T—Miami Beach, Fla.	Isle of Dreams Broadcasting Corporation.	1KW	1300	Do.
WIP	Philadelphia, Pa	Gimbel Bros. (Inc.)	500W	610	Shares with WFAN.
WIS	Columbia, S. C	South Carolina Broadcasting Co. (Inc.).	500W 1KW–LS	1010	Unlimited.

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[14] C. P. to increase power to 100 watts.

[15] C. P. to increase power to 250 watts, to change frequency to 1410 kc., and to operate one-half time.

[16] WISJ temporarily operating on 780 kilocycles.

[17] Experimentally.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WISJ	South Madison, Wis	The Wisconsin State Journal Broadcasting Co.	250W 500W–LS	[18]780	Unlimited.
WISN	Milwaukee, Wis	Evening Wisconsin Co	250W	1120	Shares with WHAD.
WJAC	Johnstown, Pa	Johnstown Automobile Co	100W	1310	Shares with WFBG.
WJAG	Norfolk, Nebr	Norfolk Daily News	1KW	1060	Limited.
WJAK	Marion, Ind	Marion Broadcast Co	50W	1310	Shares with WLBC.
WJAR	Providence, R. I	The Outlet Co	250W 400W–LS	890	Unlimited.
WJAS	Pittsburgh, Pa. T—North Fayette Township, Pa.	Pittsburgh Radio Supply House	1KW 2½KW–LS	1290	Do.
WJAX	Jacksonville, Fla	City of Jacksonville	1KW	900	Do.
WJAY	Cleveland, Ohio	Cleveland Radio Bradcasting Corporation.	500W	610	Daytime.
WJAZ	Mount Prospect, Ill	Zenith Radio Corporation	5KW	1490	Shares with WCHI and WCKY.
WJBC	La Salle, Ill	Wayne Hummer and H. J. Dee, doing business as Kaskaskia Broadcasting Co.	100W	1200	Shares with WJBL.
WJBI	Red Bank, N. J	Monmouth Broadcasting Co	100W	1210	Shares with WGBB, WCOH, and WMRJ.
WJBK	Highland Park, Mich	James F. Hopkins (Inc.)	50W	1370	Shares with WIBM.
WJBL	Decatur, Ill	Commodore Broadcasting (Inc.)	100W	1200	Shares with WJBC.
WJBO	New Orleans, La	Valdemar Jensen	100W	1420	Unlimited.
WJBT–WBBM	See WBBM–WJBT.				
WJBU	Lewisburg, Pa	Bucknell University	100W	1210	Shares with WBAX.
WJBW	New Orleans, La	C. Carlson	30W [19]	1200	Shares with WABZ.
WJBY	Gadsden, Ala	Gadsden Broadcasting Co. (Inc.)	50W	1210	Unlimited.
WJDX	Jackson, Miss	Lamar Life Insurance Co	1KW	1270	Do.
WJJD	Mooseheart, Ill	Supreme Lodge of the World, Loyal Order of Moose.	20KW	1130	Limited.
WJKS	Gary, Ind	Johnson-Kennedy Radio Corporation.	1KW 1¼KW–LS	1360	Shares with WGES.

WJR	Detroit, Mich. T—Sylvan Lake Village, Mich.	WJR, the Goodwill Station (Inc.)	5KW	750	Unlimited.
WJSV	Alexandria, Va. T—Mount Vernon Hills, Va.	Independent Publishing Co	10KW	1460	Do.
WJW	Mansfield, Ohio	John F. Weimer, owner Mansfield Broadcasting Association.	100W	1210	Do.
WJZ	New York, N. Y. T—Bound Brook, N. J.	National Broadcasting Co. (Inc.)	30KW–LP	760	Do.
WKAQ	San Juan, P. R	Radio Corporation of Porto Rico	500W	890	Do.
WKAR	E. Lansing, Mich	Michigan State College	1KW	1040	Daytime.
WKAV	Laconia, N. H	Laconia Radio Club	100W	1310	Unlimited.
WKBB	Joliet, Ill	Sanders Bros. Radio Station	100W	1310	Shares with WCLS.
WKBC	Birmingham, Ala	R. B. Broyles, trading as R. B. Broyles Furniture Co.	100W	1310	Unlimited.
WKBF	Indianapolis, Ind. T—Clermont, Ind.	Indianapolis Broadcasting (Inc.)	500W	1400	Shares with WBAA and WCMA.
WKBH	La Crosse, Wis	WKBH (Inc.)	1KW	1380	Shares with KSO.
WKBI	Chicago, Ill	Fred L. Schoenwolf	100W	1420	Shares with WHFC and WEHS.
WKBN	Youngstown, Ohio	Warren P. Williamson, jr	500W	570	Shares with WEAO.
WKBO	Jersey City, N. J	Camith Corporation	250W	1450	Shares with WBMS, WNJ, and WHOM.
WKBS	Galesburg, Ill	Permil N. Nelson	100W	1310	Unlimited.
WKBV	Connersville, Ind	Wm. O. Knox, trading as Knox Battery & Electric Co.	100W 150W–LS	1500	Do.
WKBW	Buffalo, N. Y. T—Amherst, N. Y.	WKBW (Inc.)	5KW	1480	Do.
WKBZ	Ludington, Mich	Karl L. Ashbacker	50W	1500	Do.
WKJC	Lancaster, Pa	Kirk Johnson & Co	100W	1200	Shares with WCOD.
WKRC	Cincinnati, Ohio	WKRC (Inc.)	1KW	550	Unlimited.
WKY	Oklahoma City, Okla	WKY Radiophone Co	1KW	900	Do.
WKZO	Berrien Springs, Mich	WKZO (Inc.)	1KW	590	Daytime.
WLAC	Nashville, Tenn	Life & Casualty Insurance Co. of Tennessee.	5KW	1470	Unlimited.
WLAP	Louisville, Ky	American Broadcasting Corporation of Kentucky.	100W 250W–LS	1200	Do.

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[18] Experimentally.

[19] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WLB-WGMS	Minneapolis, Minn. T—St. Paul, Minn.	University of Minnesota	1KW	1250	Shares with WCAL, KFMX, and WRHM.
WLBC	Muncie, Ind	Donald A. Burton	50W	1310	Shares with WJAK.
WLBF	Kansas City, Kans	The WLBF Broadcasting Co	100W	1420	Unlimited.
WLBG	Petersburg, Va. T—Ettrick, Va.	Robert Allen Gamble	100W 250W-LS	1200	Do.
WLBL	Stevens Point, Wis	State of Wisconsin, Department of Agriculture and Markets.	2KW	900	Daytime.
WLBW	Oil City, Pa	Radio-Wire Program Corporation of America.	500W 1KW-LS	1260	Unlimited.
WLBX	Long Island City, N. Y	John N. Brahy	100W	1500	Shares with WCLB, WWRL, and WMBQ.
WLBZ	Bangor, Me	Maine Broadcasting Co. (Inc.)	500W	620	Unlimited.
WLCI	Ithaca, N. Y	Lutheran Association of Ithaca, N. Y.	50W	1210	Do.
WLEX	Lexington, Mass	Bay State Broadcasting Corporation.	500W	1410	Shares with WMAF and WSSH.
WLEY	do	Carl S. Wheeler, trading as the Lexington Air Stations.	100W 250W-LS	1370	One-half time.
WLIB-WGN	See WGN-WLIB.				
WLIT	Philadelphia, Pa	Lit Bros	500W	560	Shares with WFI.
WLOE	Boston, Mass. T—Chelsea, Mass.	Boston Broadcasting Co	100W 250W-LS	1500	One-half time.
WLS	Chicago, Ill. T—Crete, Ill.	Agricultural Broadcasting Co	5KW [20]	870	Shares with WENR-WBCN.
WLSI-WDWF	See WDWF-WLSI.				
WLTH	Brooklyn, N. Y	Voice of Brooklyn (Inc.)	500W	1400	Shares with WCGU, WBBC, and WFOX.
WLVA	Lynchburg, Va	Lynchburg Broadcasting Corporation.	100W	1370	Shares with WBTM.
WLW	Cincinnati, Ohio. T—Mason, Ohio.	Crosley Radio Corporation	50KW-LP	700	Unlimited.

WLWL	New York, N. Y. T—Kearny, N. J.	Missionary Society of St. Paul the Apostle.	5KW	1100	Shares with WPG.
WMAC-WSYR	See WSYR-WMAC.				
WMAF	South Dartmouth, Mass	Round Hills Radio Corporation	500W	1410	Shares with WLEX and WSSH
WMAK	Buffalo, N. Y. T—Grand Island, N. Y.[21]	Buffalo Broadcasting Corporation	1KW	1040	Limited.
WMAL	Washington, D. C	M. A. Leese	250W 500W-LS	630	Unlimited.
WMAQ	Chicago, Ill. T—Addison, Ill.	WMAQ (Inc.)	5KW	670	Do.
WMAZ	Macon, Ga	Macon Junior Chamber of Commerce.	250W 500W-LS	890	Shares with WGST.
WMBA	Newport, R. I	Leroy Joseph Beebe	100W	1500	Unlimited.
WMBC	Detroit, Mich	Michigan Broadcasting Co	100W 250W-LS	1420	Do.
WMBD	Peoria Heights, Ill	E. M. Kahler (owner Peoria Heights Radio Laboratory).	500W 1KW-LS	1440	Shares with WTAD.
WMBF-WIOD	See WIOD-WMBF.				
WMBG	Richmond, Va	Havens & Martin (Inc.)	100W	1210	Unlimited, except Sundays, shares with WBBL.
WMBH	Joplin, Mo	Edwin Dudley Aber	100W 250W-LS	1420	Unlimited.
WMBI	Chicago, Ill. T—Addison, Ill.	The Moody Bible Institute Radio Station.	5KW	1080	Limited. Shares with WCBD.
WMBO	Auburn, N. Y	George I. Stevens, trading as Radio Service Laboratories.	100W	1310	Unlimited.
WMBQ	Brooklyn, N. Y	Paul J. Gollhofer	100W	1500	Shares with WCLB, WWRL, and WLBX.
WMBR	Tampa, Fla	F. J. Reynolds	100	1370	Unlimited.
WMC	Memphis, Tenn. T—Bartlett, Tenn.	Paul Dillard and Enoch Brown, jr., receivers.	500W 1KW-LS	780	Do.
WMCA	New York, N. Y. T—Hoboken, N. J.	Knickerbocker Broadcasting Co. (Inc.).	500W	570	Shares with WNYC.
WMMN	Fairmont, W. Va	Holt-Rowe Novelty Co	250W 500W-LS	890	Unlimited.
WMPC	Lapeer, Mich	First Methodist Protestant Church of Lapeer.	100W	1500	Do.

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[20] C. P. to increase power to 50KW-LP.

[21] C. P. to move transmitter to Amherst, N. Y.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued.

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WMRJ	Jamaica, N. Y	Peter J. Prinz	100W	1210	Shares with WGBB, WJBI, and WCOH.
WMSG	New York, N. Y	Madison Square Garden Broadcast Corporation.	250W	1350	Shares with WAWZ, WCDA, and WBNX.
WMT	Waterloo, Iowa	Waterloo Broadcasting Co	500W	600	Unlimited.
WNAC-WBIS	Boston, Mass. T—Quincy, Mass.	Shepard Broadcasting Service (Inc.).	1KW	1230	Do.
WNAD	Norman, Okla	University of Oklahoma	500W	1010	Shares with KGGF.
WNAX	Yankton, S. Dak	House of Gurney (Inc.)	1KW	570	Unlimited.
WNBF	Binghamton, N. Y	Howitt-Wood Radio Co. (Inc.)	100W	1500	Do.
WNBH	New Bedford, Mass. T—Fairhaven, Mass.	Irving Vermilya, trading as New Bedford Broadcasting Co.	100W	1310	Do.
WNBO	Silver Haven, Pa	John Brownlee Spriggs	100W	1200	Shares with WHBC on Sundays.
WNBR	Memphis, Tenn	Memphis Broadcasting Co	500W	1430	Shares with WGBC.
WNBW	Carbondale, Pa	G. F. Schiessler and M. F. Stephens, doing business as Home Cut Glass & China Co.	10W	1200	Unlimited.
WNBX	Springfield, Vt	First Congregational Church Corporation.	10W	1200	Shares with WCAX.
WNBZ	Saranac Lake, N. Y	Earl J. Smith and William Mace, doing business as Smith & Mace.	50W	1290	Daytime.
WNJ	Newark, N. J	Radio Investment Co. (Inc.)	250W	1450	Shares with WBMS, WHOM, and WKBO.
WNOX	Knoxville, Tenn	Sterchi Bros	1KW 2KW-LS	560	Unlimited.
WNYC	New York, N. Y	City of New York, Department of Plant and Structures.	500W	570	Shares with WMCA.
WOAI	San Antonio, Tex. T—Selma, Tex.	Southern Equipment Co	50KW-LP	1190	Unlimited.
WOAN-WREC	See WRECWOAN.				

WOAX	Trenton, N. J	WOAX (Inc.)	500W	1280	Shares with WCAM and WCAP.
WOBT	Union City, Tenn	A. F. Tittsworth, trading as Tittsworth Radio & Music Shop.	100W 250W–LS	1310	Unlimited.
WOBU	Charleston, W. Va	WOBU (Inc.)	250W	580	Shares with WSAZ.
WOC	Davenport, Iowa	Central Broadcasting Co	5KW	1000	Synchronizes with WHO experimentally.
WOCL	Jamestown, N. Y	A. E. Newton	25W	1210	Unlimited.
WODA	Paterson, N. J	Richard E. O'Dea	1KW	1250	Shares with WGCP and WAAM.
WODX	Mobile, Ala. T—Springhill, Ala.	Mobile Broadcasting Corporation	500W	1410	Shares with WSFA.
WOI	Ames, Iowa	Iowa State College of Agriculture and Mechanic Arts.	5KW	640	Daytime.
WOKO	Poughkeepsie, N. Y. T—Mount Beacon, N. Y.[22]	WOKO (Inc.)	500W	1440	Shares with WHEC-WABO.
WOL	Washington, D. C	American Broadcasting Co	100W	1310	Unlimited.
WOMT	Manitowoc, Wis	Francis M. Kadow	100W	1210	Do.
WOOD	Grand Rapids, Mich. T—Furnwood, Mich.	Walter B. Stiles (Inc.)	500W	1270	Shares with WASH.
WOPI	Bristol, Tenn	Radiophone Broadcasting Station WOPI (Inc.).	100W	1500	Unlimited.
WOQ	Kansas City, Mo	Unity School of Christianity	1KW	1300	Shares with KFH.
WOR	Newark, N. J. T—Kearny, N. J.	Bamberger Broadcasting Service (Inc.).	5KW	710	Unlimited.
WORC-WEPS	Worcester, Mass. T—Auburn, Mass.	Alfred Frank Kleindienst	100W	1200	Do.
WOS	Jefferson City, Mo	Missouri State Marketing Bureau	500W	630	Shares with WGBF and KFRU.
WOV	New York, N. Y. T—Secaucus, N. J.	International Broadcasting Corporation.	1KW	1130	Daytime until 6 p. m.
WOW	Omaha, Nebr	Woodmen of the World Life Insurance Association.	1KW	590	Shares with WCAJ.
WOWO	Fort Wayne, Ind	Main Auto Supply Co	10KW	1160	Shares with WWVA.
WPAD	Paducah, Ky	Pierce E. Lackey and S. Houston McNutt, doing business as Paducah Broadcasting Co.	100W	1420	Unlimited.
WPAP–WQAO	See WQAO–WPAP.				
WPAW	Pawtucket, R. I	Shartenberg & Robinson Co	100W	1210	Shares with WDWF–WLSI.

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[22] C. P. to move transmitter and studio to Albany, N. Y.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WPCC	Chicago, Ill	North Shore Church	500W	560	Shares with WIBO and WISJ.[23]
WPCH	New York, N. Y. T—Hoboken, N. J.	Eastern Broadcasters (Inc.)	500W	810	Daytime.
WPEN	Philadelphia, Pa	Wm. Penn Broadcasting Co	100W 250W–LS	1500	Unlimited.
WPG	Atlantic City, N. J	WPG Broadcasting Corporation	5KW	1100	Shares with WLWL.
WPOE	Patchogue, N. Y	Nassau Broadcasting Corporation	100W	1370	Unlimited.
WPOR–WTAR	See WTAR–WPOR.				
WPSC	State College, Pa	Pennsylvania State College	500W	1230	Daytime.
WPTF	Raleigh, N. C	Durham Life Insurance Co	1KW	680	Limited.
WQAM	Miami, Fla	Miami Broadcasting Co	1KW	560	Unlimited.
WQAN	Scranton, Pa	E. J. Lynett, proprietor The Scranton Times.	250W	880	Shares with WGBI.
WQAO–WPAP	New York, N. Y. T—Cliffside, N. J.	Calvary Baptist Church	250W	1010	Shares with WHN and WRNY.
WQBC	Vicksburg, Miss	Delta Broadcasting Co. (Inc.)	300W	1360	Daytime. C. P. only.
WQDM	St. Albans, Vt	A. J. St. Antoine	5W[24]	1370	Daytime.
WQDX	Thomasville, Ga	Stevens Luke	50W	1210	Unlimited.
WRAF	LaPorte, Ind	Charles Middleton	100W	1200	Shares with WWAE.
WRAK	Williamsport, Pa	Clarence R. Cummins	50W[25]	1370	Unlimited.
WRAW	Reading, Pa	Reading Broadcasting Co	50W[26]	1310	Shares with WGAL.
WRAX	Philadelphia, Pa	WRAX Broadcasting Co	250W	1020	Daytime.
WRBI	Tifton, Ga.	Chas. A. and Milton U. Kent, doing business as Kent's Furniture & Music Store.	20W[27]	1310	One-half time.
WRBJ	Hattiesburg, Miss	Woodruff Furniture Co. (Inc.)	10W	1370	Unlimited.
WRBL	Columbus, Ga	David Parmer	50W	1200	Do.
WRBQ	Greenville, Miss	J. Pat Scully	100W 250W–LS	1210	Do.
WRBT	Wilmington, N. C	Wilmington Radio Association (Inc.).	100W	1370	Do.
WRBX	Roanoke, Va	Richmond Development Corporation.	250W	1410	One-half time.

WRC	Washington, D. C	National Broadcasting Co. (Inc.)	500W	950	Unlimited.
WRDO	Augusta, Me	Albert S. Woodman	100W	1370	Unlimited. C. P. only.
WRDW	Augusta, Ga	Musicove (Inc.)	100W	1500	Unlimited.
WREC-WOAN	Memphis, Tenn. T—Whitehaven, Tenn.	WREC (Inc.)	500W 1KW-LS	600	Do.
WREN	Lawrence, Kans	Jenny Wren Co	1KW	1220	Shares with KFKU.
WRHM	Minneapolis, Minn. T—Fridley, Minn.	Minnesota Broadcasting Corporation.	1KW	1250	Shares with WLB, WCAL, and KFMX.
WRJN	Racine, Wis	Racine Broadcasting Corporation	100W	1370	Unlimited.
WRNY	New York, N. Y. T—Coytesville, N. J.	Aviation Radio Station (Inc.)	250W	1010	Shares with WQAO-WPAP and WHN.
WROL	Knoxville, Tenn	Stuart Broadcasting Corporation	100W	1310	Unlimited.
WRR	Dallas, Tex	City of Dallas, Tex	500W	1280	Do.
WRUF	Ganesville, Fla	University of Florida	5KW	830	Limited.
WRVA	Richmond, Va. T—Mechanicsville, Va.	Larus & Bro. Co. (Inc.)	5KW	1110	Unlimited.
WSAI	Cincinnati, Ohio. T—Mason, Ohio.	Crosley Radio Corporation (lessee)	500W	1330	Do.
WSAJ	Grove City, Pa	Grove City College	100W	1310	Do.
WSAN	Allentown, Pa	Allentown Call Publishing Co. (Inc.).	250W	1440	Shares with WCBA.
WSAR	Fall River, Mass	Doughty & Welch Electric Co. (Inc.).	250W	1450	Unlimited.
WSAZ	Huntington, W. Va	WSAZ (Inc.)	250W	580	Shares with WOBU.
WSB	Atlanta, Ga	Atlanta Journal Co	5KW	740	Unlimited.
WSBC	Chicago, Ill	World Battery Co. (Inc.)	100W	1210	Shares with WEDC and WCRW.
WSBT	South Bend, Ind	South Bend Tribune	500W	1230	Shares with WFBM.
WSDA-WSGH	*See* WSGH-WSDA.				
WSEN	Columbus, Ohio	Columbus Broadcasting Corporation.	100W	1210	Unlimited.
WSFA	Montgomery, Ala	Montgomery Broadcasting Co. (Inc.).	500W	1410	Shares with WODX.
WSIX	Springfield, Tenn	Jack M. and Louis R. Draughon, doing business as 638 Tire & Vulcanizing Co.	100W	1210	Unlimited.
WSJS	Winston-Salem, N. C	Winston-Salem Journal Co	100W	1310	Do.

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[23] WISJ temporarily operating on 780 kilocycles.

[24] C. P. to increase power to 100 watts.

[25] C. P. to increase power to 100 watts.

[26] C. P. to increase power to 100 watts.

[27] C. P. to increase power 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
WSM	Nashville, Tenn	National Life & Accident Insurance Co.	5KW	650	Unlimited.
WSMB	New Orleans, La	Saenger Theatres (Inc.) & Maison Blanche Co.	500W	1320	Do.
WSMK	Dayton, Ohio	Stanley M. Krohn, jr	200W	1380	Shares with KQV at night.
WSOC	Gastonia, N. C	WSOC (Inc.)	100W	1210	Unlimited.
WSPA	Spartanburg, S. C	Virgil V. Evans, trading as The Voice of South Carolina.	100W 250W-LS	1420	Do.
WSPD	Toledo, Ohio	Toledo Broadcasting Co	500W 1KW-LS	1340	Do.
WSSH	Boston, Mass	Tremont Temple Baptist Church	500W	1410	Shares with WLEX and WMAF.
WSUI	Iowa City, Iowa	State University of Iowa	500W	880	Three-sevenths time.
WSUN-WFLA	See WFLA-WSUN.				
WSVS	Buffalo, N. Y	Seneca Vocational High School (Elmer S. Pierce, principal).	50W	1370	Unlimited.
WSYB	Rutland, Vt	H. E. Seward, jr. and Philip Weiss, doing business as Seward & Weiss Music Co.	100W	1500	Do.
WSYR-WMAC	Syracuse, N. Y	Clive B. Meredith	250W	570	Do.
WTAD	Quincy, Ill	Illinois Stock Medicine Broadcasting Corporation.	500W	1440	Shares with WMBD.
WTAG	Worcester, Mass.	Worcester Telegram Publishing Co. (Inc.)	250W	580	Unlimited.
WTAM	Cleveland, Ohio. T—Brecksville Village, Ohio	National Broadcasting Co., (Inc.)	50KW-LP	1070	Do.
WTAQ	Eau Claire, Wis. T—Township of Washington, Wis.	Gillette Rubber Co.	1KW	1330	Shares with KSCJ.
WTAR-WPOR	Norfolk, Va	WTAR Radio Corporation.	500W	780	Unlimited.
WTAW	College Station, Tex.	Agricultural & Mechanical College of Texas.	500W	1120	Shares with KTRH.
WTAX	Springfield, Ill.	WTAX, Incorporated	100W	1210	Shares with WCBS.

WTBO	Cumberland, Md	Associated Broadcasting Corporation.	100W 250W-LS	1420	Unlimited.
WTEL	Philadelphia, Pa.	Foulkrod Radio Engineering Co.	50W[28]	1310	Shares with WHAT.
WTFI	Toccoa, Ga	Toccoa Falls Institute	500W	1450	Unlimited.
WTIC	Hartford, Conn. T—Avon Conn.	Travelers Broadcasting Service	50KW-LP	1060	Shares with WBAL.
WTMJ	Milwaukee, Wis. T=Brookfield, Wis.	The Journal Co. (Milwaukee Journal).	1KW 2½KW-LS	620	Unlimited.
WTOC	Savannah, Ga	Savannah Broadcasting Co., (Inc.)	500W	1260	Do.
WWAE	Hammond, Ind	Hammond-Calumet Broadcasting Corporation.	100W	1200	Shares with WRAF.
WWJ	Detroit, Mich	The Evening News Association (Inc.)	1KW	920	Unlimited.
WWL	New Orleans, La	Loyola University	5KW	850	Shares with KWKH.
WWNC	Asheville, N. C	Citizen Broadcasting Co. (Inc.)	1KW	570	Unlimited.
WWRL	Woodside, N. Y	Long Island Broadcasting Corporation.	100W	1500	Shares with WMBQ, WL X, and WCLB.
WWSW	Pittsburgh, Pa.	William S. Walker	100W	1500	Unlimited. C. P. only.
WWVA	Wheeling, W. Va.	West Virginia Broadcasting Corporation.	5KW	1160	Shares with WOWO.
WXYZ	Detroit, Mich	Kunsky-Trendle Broadcasting Corporation.	1KW	1240	Unlimited.
KBPS	Portland, Oreg	Benson Polytechnic School	100W	1420	Shares with KXL.
KBTM	Paragould, Ark	W. J. Beard, (Beard's Temple of Music).	100W	1200	Daytime.
KCRC	Enid, Okla	Champlin Refining Co	100W 250W-LS	1370	Shares with KGFG.
KCRJ	Jerome, Ariz	Charles C. Robinson	100W	1310	Unlimited.
KDB	Santa Barbara, Calif	Dwight Faulding	100W	1500	Do.
KDFN	Casper, Wyo	Donald Lewis Hathaway	100W	1210	Do.
KDKA	Pittsburgh, Pa. T—Saxonburg, Pa.	Westinghouse Electric & Manufacturing Co.	50KW-LP	980	Do.
KDLR	Devils Lake, N. Dak	KDLR (Inc.)	100W	1210	Do.
KDYL	Salt Lake City, Utah	Intermountain Broadcasting Corporation.	1KW	1290	Do.
KECA	Los Angeles, Calif	Pacific Development Radio Co	1KW	1430	Do.

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[28] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
KELW	Burbank, Calif	Union Bank & Trust Co. of Los Angeles, guardian of the estate of Earl L. White.	500W	780	Shares with KTM.
KEX	Portland, Oreg	Western Broadcasting Co	5KW	1180	Shares with KOB.
KFAB	Lincoln, Nebr	KFAB Broadcasting Co	5KW	770	Shares with WBBM-WJBT.
KFBB	Great Falls, Mont	Buttrey Broadcast (Inc.)	1KW 2½KW-LS	1280	Unlimited.
KFBK	Sacramento, Calif	James McClatchy Co	100W	1310	Do.
KFBL	Everett, Wash	Otto Leese & Robert Leese doing business as Leese Bros.	50W	1370	Shares with KVL.
KFDM	Beaumont, Tex	Magnolia Petroleum Co	500W 1KW-LS	560	Unlimited.
KFDY	Brookings, S. Dak	South Dakota State College	500W 1KW-LS	550	Shares with KFYR.
KFEL	Denver, Colo.[29]	Eugene P. O'Fallon (Inc.)	500W	920	Shares with KFXF.
KFEQ	St. Joseph, Mo	Scroggin & Co. Bank	2½KW	680	Daytime.
KFGQ	Boone, Iowa	Boone Biblical College	100W	1310	Shares with KWCR and KFJY.
KFH	Wichita, Kans	Radio station KFH Co	1KW	1300	Shares with WOQ.
KFI	Los Angeles, Calif.[30]	Earle C. Anthony (Inc.)	5KW	640	Unlimited.
KFIO	Spokane, Wash	Spokane Broadcasting Corporation	100W	1120	Daytime.
KFIU	Juneau, Alaska	Alaska Electric Light & Power Co	10W	1310	Unlimited.
KFIZ	Fond du Lac, Wis	The Reporter Printing Co	100W	1420	Do.
KFJB	Marshalltown, Iowa	Marshall Electric Co. (Inc.)	100W 250W-LS	1200	One-half time.
KFJF	Oklahoma City, Okla	National Radio Manufacturing Co.	5KW	1480	Unlimited.
KFJI	Astoria, Oreg	KFJI Broadcasters (Inc.)	100W	1370	Do.
KFJM	Grand Forks, N. Dak	University of North Dakota	100W	1370	Do.
KFJR	Portland, Oreg	Ashley C. Dixon trading as Ashley C. Dixon & Son.	500W	1300	Shares with KTBR.
KFJY	Fort Dodge, Iowa	C. S. Tunwall	100W	1310	Shares with KFGQ and KWCR.

KFJZ	Fort Worth, Tex	Margaret Meacham Hightower, Minnie Meacham Smith, and Mary Meacham, executrices of the estate of H. C. Meacham, deceased.	100W	1370	Unlimited.
KFKA	Greeley, Colo	The Mid-Western Radio Corporation.	500W 1KW-LS	880	Shares with KPOF.
KFKB	Milford, Kans	The KFKB Broadcasting Association (Inc.).	5KW	1050	Limited.
KFKU	Lawrence, Kans	University of Kansas	500W	1220	Shares with WREN.
KFKX-KYW	See KYW-KFKX.				
KFLV	Rockford, Ill	Rockford Broadcasters (Inc.)	500W	1410	Shares with WHBL.
KFLX	Galveston, Tex	George Roy Clough	100W	1370	Unlimited.
KFMX	Northfield, Minn	Carleton College	1KW	1250	Shares with WCAL, WRHM and WLB.
KFNF	Shenandoah, Iowa	Henry Field Co	500W 1KW-LS	890	Shares with WILL and KUSD.
KFOR	Lincoln, Nebr	Howard A. Shuman	100W 250W-LS	1210	Unlimited.
KFOX	Long Beach, Calif	Nichols & Warinner (Inc.)	1KW	1250	Do.
KFPL	Dublin, Tex	C. C. Baxter	100W	1310	Do.
KFPM	Greenville, Tex	Dave Ablowich, trading as the New Furniture Co.	15W	1310	Do.
KFPW	Fort Smith, Ark	Southwestern Hotel Co	50W	1340	Daytime.
KFPY	Spokane, Wash	Symons Broadcasting Co	1KW	1340	Unlimited.
KFQD	Anchorage, Alaska	Anchorage Radio Club	100W	1230	Do.
KFQU	Holy City, Calif	W. E. Riker	100W	1420	Shares with KGGC.
KFQW	Seattle, Wash	KFQW (Inc.)	100W	1420	Unlimited.
KFRC	San Francisco, Calif	Don Lee (Inc.)	1KW	610	Do.
KFRU	Columbia, Mo	Stephens College	500W	630	Shares with WOS and WGBF.
KFSD	San Diego, Calif	Airfan Radio Corp. (Ltd.)	500W 1KW-LS	600	Unlimited.
KFSG	Los Angeles, Calif	Echo Park Evangelistic Association.	500W	1120	Shares with KMCS.
KFUL	Galveston, Tex	Will H. Ford	500W	1290	Shares with KTSA.
KFUM	Colorado Springs, Colo	W. D. Corley	1KW	1270	Unlimited.

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[29] C. P. to move transmitter to Edgewater, Colo.

[30] C. P. to move transmitter to Buena Park, Calif., and increase power to 50KW-LP.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main stuio location	Licensee	Power	Kilocycles	Time of operation
KFUO	Clayton, Mo	Evangelical Lutheran Synod of Missouri, Ohio, and other States, Rev. R. Kretzschmar, chairman, Board of Control of Concordia Seminary.	500W 1KW–LS	550	Shares with KSD.
KFUP	Denver, Colo	Fitzsimons General Hospital, United States Army.	100W	1310	Shares with KFXJ.
KFVD	Culver City, Calif	Los Angeles Broadcasting Co	250W	1000	Limited.
KFVS	Cape Girardeau, Mo	Oscar C. Hirsch, trading as Hirsch Battery & Radio Co.	100W	1210	Shares with WEBQ.
KFWB	Hollywood, Calif	Warner Brothers Broadcasting Corporation.	1KW	950	Unlimited.
KFWF	St. Louis, Mo	St. Louis Truth Center (Inc.)	100W	1200	Shares with WIL.
KFWI	San Francisco, Calif	Radio Entertainments (Inc.)	500W	930	Shares with KROW.
KFXD	Nampa, Idaho	Frank E. Hurt, trading as Service Radio Co.	50W	1420	Unlimited.
KFXF	Denver, Colo	Colorado Radio Corporation	500W	920	Shares with KFEL.
KFXJ	Edgewater, Colo.[31]	R. G. Howell and Chas. Howell, doing business as Western Slope Broadcasting Co.	50W	1310	Shares with KFUP.
KFXM	San Bernardino, Calif	J. C. and E. W. Lee (Lee Bros. Broadcasting Co.).	100W	1210	Shares with KPPC.
KFXR	Oklahoma City, Okla	Exchange Avenue Baptist Church	100W 250W–LS	1310	Unlimited.
KFXY	Flagstaff, Ariz	Mary M. Costigan	100W	1420	Do.
KFYO	Abilene, Tex	T. E. Kirksey, trading as Kirksey Bros.	100W 250W–LS	1420	Do.
KFYR	Bismarck, N. Dak	Meyer Broadcasting Co	1KW 2½KW–LS[32]	550	Shares with KFDY.
KGA	Spokane, Wash	Northwest Broadcasting System (Inc.).	5KW	1470	Unlimited.
KGAR	Tucson, Ariz	Tucson Motor Service Co	100W 250W–LS	1370	Do.

KGB	San Diego, Calif	Pickwick Broadcasting Corporation.	250W[33]	1330	Do.
KGBU	Ketchikan, Alaska	Alaska Radio & Service Co. (Inc.)	500W	900	Do.
KGBX	St. Joseph, Mo	KGBX (Inc.)	100W	1310	Do.
KGBZ	York, Nebr	Dr. George R. Miller	500W 1KW–LS	930	Shares with KMA.
KGCA	Decorah, Iowa	Chas. W. Greenley	50W	1270	Daytime. Shares with KWLC.
KGCR	Watertown, S. Dak	Cutler's Radio Broadcasting Service (Inc.).	100W	1210	Unlimited.
KGCU	Mandan, N. Dak	Mandan Radio Association	100W	1200	Do.
KGCX	Wolf Point, Mont	First State Bank of Vida	100W 250W–LS	1310	One-half time.
KGDA	Mitchell, S. Dak	Mitchell Broadcasting Corporation.	100W	1370	Unlimited.
KGDE	Fergus Falls, Minn	Chas. L. Jaren	100W 250W–LS	1200	Do.
KGDM	Stockton, Calif	E. F. Peffer	250W	1100	Daytime.
KGDY	Huron, S. Dak	Voice of South Dakota	100W	1200	Unlimited.
KGEF	Los Angeles, Calif	Trinity Methodist Church South	1KW	1300	Shares with KTBI.
KGEK	Yuma, Colo	Elmer G. Beehler, trading as Beehler Electrical Equipment Co.	50W	1200	Shares with KGEW.
KGER	Long Beach, Calif	C. Merwin Dobyns	1KW	1360	Shares with KPSN.
KGEW	Fort Morgan, Colo	City of Fort Morgan	100W	1200	Shares with KGEK.
KGEZ	Kalispell, Mont	Donald C. Treloar and Stanley R. Church, trading as Treloar-Church Broadcasting Co.	100W	1310	Unlimited.
KGFF	Alva, Okla.[34]	D. R. Wallace (owner KGFF Broadcasting Co.).	100W	1420	Do.
KGFG	Oklahoma City, Okla	Oklahoma Broadcasting Co. (Inc.)	100W	1370	Shares with KCRC.
KGFI	Corpus Christi, Tex	Eagle Broadcasting Co. (Inc.)	100W 250W–LS	1500	Unlimited.
KGFJ	Los Angeles, Calif	Ben S. McGlashan	100W	1200	Do.
KGFK	Moorhead, Minn	Red River Broadcasting Co. (Inc.)	50W	1500	Do.
KGFL	Raton, N. Mex	W. E. Whitmore	50W	1370	Do.
KGFW	Ravenna, Nebr	Central Nebraska Broadcasting Corporation.	100W	1310	Do.

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[31] C. P. to move transmitter and studio to Grand Junction and increase power to 100 watts.

[32] Experimentally.

[33] C. P. to increase power to 500 watts.

[34] C. P. to move transmitter and studio to Shawnee, Okla.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
KGFX	Pierre, S. Dak	Dana McNeil	200W	580	Daytime.
KGGC	San Francisco, Calif	The Golden Gate Broadcasting Co.	100W	1420	Shares with KFQU.
KGGF	South Coffeyville, Okla	Hugh J. Powell and Stanley Platz, doing business as Powell and Platz.	500W	1010	Shares with WNAD.
KGGM	Albuquerque, N. Mex	New Mexico Broadcasting Co	250W 500W–LS	1230	Unlimited.
KGHF	Pueblo, Colo	Curtis P. Ritchie and Joe E. Finch	250W 500W–LS	1320	Do.
KGHI	Little Rock, Ark	Berean Bible Class, First Baptist Church.	100W	1200	Do.
KGHL	Billings, Mont	Northwestern Auto Supply Co. (Inc.).	1KW	950	Do.
KGIR	Butte, Mont	KGIR (Inc.)	500W	1360	One-half time.
KGIW	Trinidad, Colo	Leonard E. Wilson	100W	1420	Unlimited.
KGIX	Las Vegas, Nev	J. M. Heaton	100W	1420	Do.
KGIZ	Grant City, Mo	Grant City Park Corporation	50W[35]	1500	Do.
KGJF	Little Rock, Ark	First Church of the Nazarene	250W	890	Do.
KGKB	Brownwood, Tex	E. M., C. T., and E. E. Wilson, doing business as Eagle Publishing Co.	100W	1500	Do.
KGKL	San Angelo, Tex	KGKL (Inc.)	100W	1370	Do.
KGKO	Wichita Falls, Tex	Wichita Falls Broadcasting Co	250W 500W–LS	570	Do.
KGKX	Sandpoint, Idaho	C. E. Twiss and F. H. McCann	100W	1420	Do.
KGKY	Scottsbluff, Nebr	Hilliard Co. (Inc.)	100W	1500	Do.
KGMB	Honolulu, Hawaii	Honolulu Broadcasting Co. (Ltd.)	500W	1320	Do.
KGMP	Elk City, Okla	Homer F. Bryant, trading as Bryant Radio & Electric Co.	100W	1210	Do.
KGNF	North Platte, Nebr	Herbert Logan Spencer	500W	1430	Daytime.
KGNO	Dodge City, Kans	Dodge City Broadcasting Co. (Inc.)	100W	1210	Unlimited.
KGO	San Francisco, Calif. T—Oakland, Calif.	National Broadcasting Co. (Inc.)	7½KW	790	Do.

KGRS	Amarillo, Tex	E. B. Gish (Gish Radio Service)	1KW	1410	Shares with WDAG.
KGU	Honolulu, Hawaii	Marion A. Mulrony and Advertiser Publishing Co. (Ltd.).	1KW	940	Unlimited.
KGVO	Missoula, Mont	Mosby's (Inc.)	100W	1420	10 a. m. to 6 p. m. C. P. only.
KGW	Portland, Oreg	Oregonian Publishing Co	1KW	620	Unlimited.
KGY	Lacey, Wash	St. Martins College	10W	1200	Do.
KHJ	Los Angeles, Calif	Don Lee (Inc.)	1KW	900	Do.
KHQ	Spokane, Wash	Louis Wasmer (Inc.)	1KW 2KW–LS	590	Do.
KICK	Red Oak, Iowa	Red Oak Radio Corporation	100W	1420	Do.
KID	Idaho Falls, Idaho	KID Broadcasting Co	250W 500W–LS	1320	Shares with KTFI at night.
KIDO	Boise, Idaho	Frank L. Hill and C. G. Phillips, doing business as Boise Broadcast Station.	1KW	1250	Unlimited.
KIT	Yakima, Wash	Carl E. Haymond	50W	1310	Do.
KJBS	San Francisco, Calif	Julius Brunton and Sons Co	100W	1070	12.01 a. m. to local sunset.
KJR	Seattle, Wash	Northwest Broadcasting System (Inc.).	5KW	970	Unlimited.
KLCN	Blytheville, Ark	Charles Leo Lintzenich	50W	1290	Daytime.
KLO	Ogden, Utah	Perry Building Co	500W	1400	Unlimited.
KLPM	Minot, N. Dak	John B. Cooley	100W	1420	Do.
KLRA	Little Rock, Ark	Arkansas Broadcasting Co	1KW	1390	Shares with KUOA.
KLS	Oakland, Calif	E. N. and S. W. Warner, doing business as Warner Bros.	250W	1440	Daytime.
KLX	do	The Tribune Publishing Co	500W	880	Unlimited.
KLZ	Denver, Colo	Reynolds Radio Co. (Inc.)	1KW	560	Do.
KMA	Shenandoah, Iowa	May Seed and Nursery Co	500W 1KW–LS	930	Shares with KGBZ.
KMAC	San Antonio, Tex	W. W. McAllister	100W	1370	Shares with KONO.
KMBC	Kansas City, Mo. T—Independence, Mo.	Midland Broadcasting Co	1KW	950	Unlimited.
KMCS	Inglewood, Calif	Dalton's (Inc.)	500W	1120	Shares with KFSG.
KMED	Medford, Oreg	Mrs. W. J. Virgin	50W	1310	Unlimited.
KMJ	Fresno, Calif	James McClatchy Co	100W	1210	Do.
KMLB	Monroe, La	J. C. Liner	50W	1200	Daytime.
KMMJ	Clay Center, Nebr	The M. M. Johnson Co	1KW	740	Limited.
KMO	Tacoma, Wash	KMO (Inc.)	500W	860	Do.

[33] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
KMOX	St. Louis, Mo	Voice of St. Louis (Inc.)	50KW–LP	1090	Unlimited.
KMPC	Beverly Hills, Calif	R. S. Macmillan	500W	710	Limited.
KMTR	Los Angeles, Calif	KMTR Radio Corporation	500W	570	Unlimited.
KNX	Hollywood, Calif. T—Los Angeles.	Western Broadcast Co	5KW[36]	1050	Do.
KOA	Denver, Colo	National Broadcasting Co. (Inc.)	12½KW	830	Do.
KOAC	Corvallis, Oreg	Oregon State Agricultural College	1KW	550	Do.
KOB	State College, N. Mex	New Mexico College of Agriculture & Mechanic Arts.	20KW	1180	Shares with KEX.
KOCW	Chickasha, Okla	Oklahoma College for Women	250W 500W–LS	1400	Unlimited.
KOH	Reno, Nev	Jay Peters (Inc.)	500W	1380	Do.
KOIL	Council Bluffs, Iowa	Mona Motor Oil Co	1KW	1260	Do.
KOIN	Portland, Oreg. T—Sylvan, Oreg.	KOIN (Inc.)	1KW	940	Do.
KOL	Seattle, Wash	Seattle Broadcasting Co. (Inc.)	1KW	1270	Shares with KTW.
KOMO	do	Fisher's Blend Station (Inc.)	1KW	920	Unlimited.
KONO	San Antonio, Tex	Mission Broadcasting Co	100W	1370	Shares with KMAC.
KOOS	Marshfield, Oreg	H. H. Hanseth (Inc.)	100W	1370	Unlimited.
KORE	Eugene, Oreg	Frank L. Hill & C. G. Phillips, doing business as Eugene Broadcast Station.	100W	1420	Do.
KOY	Phoenix, Ariz	Nielsen Radio & Sporting Goods Co.	500W	1390	Do.
KPCB	Seattle, Wash	Queen City Broadcasting Co	100W	650	Limited.
KPJM	Prescott, Ariz	A. P. Miller and Geo. R. Klahn, doing business as Miller & Klahn.	100W	1500	Unlimited.
KPO	San Francisco, Calif	Hale Brothers Stores (Inc.) and the Chronicle Publishing Co.	5KW	680	Do.
KPOF	Denver, Colo	Pillar of Fire	500W	880	Shares with KFKA.
KPPC	Pasadena, Calif	Pasadena Presbyterian Church	50W	1210	Shares with KFXM.
KPQ	Wenatchee, Wash	Wescoast Broadcasting Co	50W	1500	Unlimited.

KPRC	Houston, Tex. T—Sugarland, Tex.	Houston Printing Co	1KW 2½KW–LS	920	Do.
KPSN	Pasadena, Calif	Pasadena Star-News Publishing Co.	1KW	1360	Shares with KGER.
KQV	Pittsburgh, Pa	Doubleday-Hill Electric Co	500W	1380	Shares with WSMK at night.
KQW	San Jose, Calif	Pacific Agricultural Foundation (Ltd.)	500W	1010	Unlimited.
KRE	Berkeley, Calif	First Congregational Church of Berkeley.	100W	1370	Shares with KZM.
KREG	Santa Ana, Calif	Pacific-Western Broadcasting Federation (Ltd.).	100W	1500	Unlimited.
KRGV	Harlingen, Tex	KRGV (Inc.)	500W	1260	Shares with KWWG.
KRLD	Dallas, Tex	KRLD Radio Corporation	10KW	1040	Shares with KTHS.
KRMD	Shreveport, La	Robert M. Dean	50W	1310	Shares with KTSL.
KROW	Oakland, Calif. T—Richmond, Calif.	Educational Broadcasting Corporation.	500W 1KW–LS	930	Shares with KFWI.
KRSC	Seattle, Wash	Radio Sales Corporation	50W	1120	Daytime.
KSAC	Manhattan, Kans	Kansas State Agricultural College	500W 1KW–LS	580	Shares with WIBW.
KSCJ	Sioux City, Iowa	Perkins Bros. Co	1KW 2½KW–LS	1330	Shares with WTAQ.
KSD	St. Louis, Mo	Pulitzer Publishing Co	500W	550	Shares with KFUO.
KSEI	Pocatello, Idaho	KSEI Broadcasting Association (Inc.).	250W	900	Unlimited.
KSL	Salt Lake City, Utah	Radio Service Corporation of Utah	5KW	1130	Do.
KSMR	Santa Maria, Calif	Santa Maria Radio	100W	1200	Do.
KSO	Clarinda, Iowa	Berry Seed Co	500W	1380	Shares with WKBH.
KSOO	Sious Falls, S. Dak	Sioux Falls Broadcast Association (Inc.).	2KW	1110	Limited.
KSTP	St. Paul, Minn. T—Westcott, Minn.	National Battery Broadcasting Co	10KW	1460	Unlimited.
KTAB	San Francisco, Calif. T—Oakland, Calif.	The Associated Broadcasters (Inc.)	1KW	560	Do.
KTAP	San Antonio, Tex	Alamo Broadcasting Co. (Inc.)	100W	1420	Do.
KTAR	Phoenix, Ariz	KTAR Broadcasting Co	500W 1KW–LS	620	Do.
KTAT	Fort Worth, Tex. T—Birdville, Tex.	S. A. T. Broadcast Co	1KW	1240	Shares with WACO.
KTBI	Los Angeles, Calif	Bible Institute of Los Angeles	1KW	1300	Shares with KGEF.

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[36] C. P. to increase power to 50KW—LP.

BROADCASTING STATIONS, ALPHABETICALLY BY CALL SIGNALS—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
KTBR	Portland, Oreg	M. E. Brown	500W	1300	Shares with KFJR.
KTBS	Shreveport, La	Tri State Broadcasting System (Inc.)	1KW	1450	Unlimited.
KTFI	Twin Falls, Idaho	Radio Broadcasting Corporation	250W[37]	1320	Shares with KID at night.
KTHS	Hot Springs National Park, Ark.	Hot Springs Chamber of Commerce	10KW	1040	Shares with KRLD.
KTLC	Houston, Tex	Houston Broadcasting Co	100W	1310	Unlimited.
KTM	Los Angeles, Calif. T—Santa Monica, Calif.	Pickwick Broadcasting Corporation	500W 1KW–LS	780	Shares with KELW.
KTNT	Muscatine, Iowa	Norman Baker	5KW	1170	Limited.
KTRH	Houston, Tex	Rice Hotel	500W	1120	Shares with WTAW.
KTSA	San Antonio, Tex	Lone Star Broadcast Co. (Inc.)	1KW 2KW–LS	1290	Shares with KFUL.
KTSL	Shreveport, La	G. A. Houseman	100W	1310	Shares with KRMD.
KTSM	El Paso, Tex	W. S. Bledsoe and W. T. Blackwell	100W	1310	Shares with WDAH.
KTW	Seattle, Wash	The First Presbyterian Church of Seattle, Wash.	1KW	1270	Shares with KOL.
KUJ	Walla Walla, Wash	Paul R. Heitmeyer	100W	1370	One-half time. C. P. only.
KUOA	Fayetteville, Ark	University of Arkansas	1KW	1390	Shares with KLRA.
KUSD	Vermillion, S. Dak	University of South Dakota	500W 750W–LS	890	Shares with KFNF and WILL.
KUT	Austin, Tex	Rice Hotel	100W	1500	Unlimited.
KVI	Tacoma, Wash. T—Des Moines, Wash.	Puget Sound Broadcasting Co. (Inc.).	1KW	760	Limited.
KVL	Seattle, Wash	KVL (Inc.)	100W	1370	Shares with KFBL.
KVOA	Tucson, Ariz	Robert M. Rieulfi	500W	1260	Daytime.
KVOO	Tulsa, Okla	Southwestern Sales Corporation	5KW	1140	Shares with WAPI.
KVOS	Bellingham, Wash	KVOS (Inc.)	100W	1200	Unlimited.
KWCR	Cedar Rapids, Iowa	Harry F. Paar	100W	1310	Shares with KFJY and KFGQ.
KWEA	Shreveport, La	Hello World Broadcasting Corporation.	100W	1210	Unlimited.

KWG	Stockton, Calif	Portable Wireless Telephone Co. (Inc.).	100W	1200	Do.
KWJJ	Portland, Oreg	KWJJ Broadcast Co. (Inc.)	500W	1060	Limited.
KWK	St. Louis, Mo. T—Kirkwood, Mo.	Greater St. Louis Broadcasting Corporation.	1KW	1350	Unlimited.
KWKC	Kansas City, Mo	Wilson Duncan, trading as Wilson Duncan Broadcasting Co.	100W	1370	One-half time.
KWKH	Shreveport ,La. T—Kennonwood, La.	Hello World Broadcasting Corporation.	10KW	850	Shares with WWL.
KWLC	Decorah, Iowa	Luther College	100W	1270	Daytime, shares with KGCA.
KWSC	Pullman, Wash	State College of Washington	1KW 2KW-LS	1220	Unlimited.
KWWG	Brownsville, Tex	The Brownsville Herald Publishing Co.	500W	1260	Shares with KRGV.
KXA	Seattle, Wash	American Radio Telephone Co	500W	570	Unlimited.
KXL	Portland, Oreg	KXL Broadcasters	100W	1420	Shares with KBPS.
KXO	El Centro, Calif	E. R. Irey & F. M. Bowles	100W	1500	Unlimited.
KXRO	Aberdeen, Wash	KXRO (Inc.)	75W [38]	1310	Do.
KXYZ	Houston, Tex	Harris County Broadcast Co	100W	1420	Do.
KYA	San Francisco, Calif	Pacific Broadcasting Corporation	1KW	1230	Do.
KYW-KFKX	Chicago, Ill. T—Bloomingdale Township, Ill.	Westinghouse Electric and Manufacturing Co.	10KW	1020	Do.
KZM	Hayward, Calif	Leon P. Tenney	100W	1370	Shares with KRE.

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[37] C. P. to increase power to 500 watts LS.

[38] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		ALABAMA			
WAPI	Birmingham	Alabama Polytechnic Institute, University of Alabama and Alabama College.	5KW	1140	Shares with KVOO.
WBRC	do	Birmingham Broadcasting Co. (Inc.).	500W 1KW–LS	930	Unlimited.
WKBC	do	R. B. Broyles, trading as R. B. Broyles Furniture Co.	100W	1310	Do.
WJBY	Gadsden	Gadsden Broadcasting Co. (Inc.)	50W	1210	Do.
WODX	Mobile. T—Springhill	Mobile Broadcasting Corporation	500W	1410	Shares with WSFA.
WSFA	Montgomery	Montgomery Broadcasting Co. (Inc.).	500W	1410	Shares with WODX.
WFDW	Talladega	Raymond C. Hammett	100W	1420	Unlimited.
		ALASKA			
KFQD	Anchorage	Anchorage Radio Club	100W	1230	Unlimited.
KFIU	Juneau	Alaska Electric Light & Power Co	10W	1310	Do.
KGBU	Ketchikan	Alaska Radio & Service Co. (Inc.)	500W	900	Do.
		ARIZONA			
KFXY	Flagstaff	Mary M. Costigan	100W	1420	Unlimited.
KCRJ	Jerome	Charles C. Robinson	100W	1310	Do.
KTAR	Phoenix	KTAR Broadcasting Co	500W 1KW–LS	620	Do.
KOY	do	Nielsen Radio & Sporting Goods Co.	500W	1390	Do.
KPJM	Prescott	A. P. Miller and Geo. R. Klahn, doing business as Miller & Klahn.	100W	1500	Do.

KVOA	Tucson	Robert M. Riculfi	500W	1260	Daytime.
KGAR	do	Tucson Motor Service Co	100W 250W-LS	1370	Unlimited.

ARKANSAS

KLCN	Blytheville	Charles Leo Lintzenich	50W	1290	Daytime.
KUOA	Fayetteville	University of Arkansas	1KW	1390	Shares with KLRA.
KFPW	Fort Smith	Southwestern Hotel Co	50W	1340	Daytime.
KTHS	Hot Springs National Park.	Hot Springs Chamber of Commerce.	10KW	1040	Shares with KRLD.
KLRA	Little Rock	Arkansas Broadcasting Co	1KW	1390	Shares with KUOA.
KGHI	do	Berean Bible Class, First Baptist Church.	100W	1200	Unlimited.
KGJF	do	First Church of the Nazarene	250W	890	Do.
KBTM	Paragould	W. J. Beard (Beard's Temple of Music).	100W	1200	Daytime.

CALIFORNIA

KRE	Berkeley	First Congregational Church of Berkeley.	100W	1370	Shares with KZM.
KMPC	Beverly Hills	R. S. Macmillan	500W	710	Limited.
KELW	Burbank	Union Bank & Trust Co. of Los Angeles, guardian of estate of Earl L. White.	500W	780	Shares with KTM.
KFVD	Culver City	Los Angeles Broadcasting Co	250W	1000	Limited.
KXO	El Centro	E. R. Irey and F. M. Bowles	100W	1500	Unlimited.
KMJ	Fresno	James McClatchy Co	100W	1210	Do.
KZM	Hayward	Leon P. Tenney	100W	1370	Shares with KRE.
KFWB	Hollywood	Warner Bros., Broadcasting Corporation.	1KW	950	Unlimited.
KNX	Hollywood. T—Los Angeles.	Western Broadcast Co	5KW[1]	1050	Do.
KFQU	Holy City	W. E. Riker	100W	1420	Shares with KGGC.
KMCS	Inglewood	Dalton's (Inc.)	500W	1120	Shares with KFSG.
KGER	Long Beach	C. Merwin Dobyns	1KW	1360	Shares with KPSN.
KFOX	do	Nichols & Warinner (Inc.)	1KW	1250	Unlimited.
KFI	Los Angeles[2]	Earle C. Anthony (Inc.)	5KW	640	Do.

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[1] C. P. to increase power to 50KW-LP.

[2] C. P. to move transmitter to Buena Park, Calif. and increase power to 50KW-LP.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		CALIFORNIA			
KFSG	Los Angeles	Echo Park Evangelistic Association.	500W	1120	Shares with KMCS.
KGEF	do	Trinity Methodist Church, South	1KW	1300	Shares with KTBI.
KGFJ	do	Ben S. McGlashan	100W	1200	Unlimited.
KHJ	do	Don Lee (Inc.)	1KW	900	Do.
KTBI	do	Bible Institute of Los Angeles	1KW	1300	Shares with KGEF.
KECA	do	Pacific Development Radio Co	1KW	1430	Unlimited.
KTM	Los Angeles. T—Santa Monica.	Pickwick Broadcasting Corporation.	500W 1KW–LS	780	Shares with KELW.
KMTR	Los Angeles	KMTR Radio Corporation	500W	570	Unlimited.
KLX	Oakland	The Tribune Publishing Co	500W	880	Do.
KLS	do	E. N. and S. W. Warner, doing business as Warner Bros.	250W	1440	Daytime.
KROW	Oakland. T—Richmond	Educational Broadcasting Corporation.	500W 1KW–LS	930	Shares with KFWI.
KPPC	Pasadena	Pasadena Presbyterian Church	50W	1210	Shares with KFXM.
KPSN	do	Pasadena Star-News Publishing Co.	1KW	1360	Shares with KGER.
KFBK	Sacramento	James McClatchy Co	100W	1310	Unlimited.
KFXM	San Bernardino	J. C. and E. W. Lee (Lee Bros. Broadcasting Co.).	100W	1210	Shares with KPPC.
KFSD	San Diego	Airfan Radio Corporation (Ltd.)	500W 1KW–LS	600	Unlimited.
KGB	do	Pickwick Broadcasting Corporation.	250W[3]	1330	Do.
KGO	San Francisco. T—Oakland.	National Broadcasting Co. (Inc.)	7½KW	790	Do.
KFRC	San Francisco	Don Lee (Inc.)	1KW	610	Do.
KGGC	do	The Golden Gate Broadcasting Co	100W	1420	Shares with KFQU.
KFWI	do	Radio Entertainments (Inc.)	500W	930	Shares with KROW.
KJBS	do	Julius Brunton & Sons Co	100W	1070	12.01 a. m. to local sunset.

KPO	do	Hale Bros. Stores (Inc.) and The Chronicle Publishing Co.	5KW	680	Unlimited.
KTAB	San Francisco. T—Oakland.	The Associated Broadcasters (Inc.)	1KW	560	Do.
KYA	San Francisco	Pacific Broadcasting Corporation	1KW	1230	Do.
KQW	San Jose	Pacific Agricultural Foundation (Ltd.).	500W	1010	Do.
KREG	Santa Ana	Pacific-Western Broadcasting Federation (Ltd.).	100W	1500	Do.
KDB	Santa Barbara	Dwight Faulding	100W	1500	Do.
KSMR	Santa Maria	Santa Maria Radio	100W	1200	Do.
KGDM	Stockton	E. F. Peffer	250W	1100	Daytime.
KWG	do	Portable Wireless Telephone Co. (Inc.).	100W	1200	Unlimited.
		COLORADO			
KFUM	Colorado Springs	W. D. Corley	1KW	1270	Unlimited.
KPOF	Denver	Pillar of Fire	500W	880	Shares with KFKA.
KFUP	do	Fitzsimons General Hospital, U. S. Army.	100W	1310	Shares with KFXJ.
KFEL	do.[4]	Eugene P. O'Fallon (Inc.)	500W	920	Shares with KFXF.
KFXF	do	Colorado Radio Corporation	500W	920	Shares with KFEL.
KOA	do	National Broadcasting Co. (Inc.)	12½KW	830	Unlimited.
KLZ	do	Reynolds Radio Co. (Inc.)	1KW	560	Do.
KFXJ	Edgewater[5]	R. G. Howell and Chas. Howell, doing business as Western Slope Broadcasting Co.	50W	1310	Shares with KFUP.
KGEW	Fort Morgan	City of Fort Morgan	100W	1200	Shares with KGEK.
KFKA	Greeley	The Mid-Western Radio Corporation.	500W 1KW-LS	880	Shares with KPOF.
KGHF	Pueblo	Curtis P. Ritchie and Joe E. Finch	250W 500W-LS	1320	Unlimited.
KGIW	Trinidad	Leonard E. Wilson	100W	1420	Do.
KGEK	Yuma	Elmer G. Beehler, trading as Beehler Electrical Equipment Co.	50W	1200	Shares with KGEW.

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[3] C. P. to increase power to 500 watts.
[4] C. P. to move transmitter to Edgewater, Colo.
[5] C. P. to move transmitter and studio to Grand Junction, Colo., and increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		CONNECTICUT			
WICC	Bridgeport. T—Easton	Bridgeport Broadcasting Station (Inc.).	500W	1190	Daytime.
WTIC	Hartford. T—Avon	Travelers Broadcasting Service	50KW–LP	1060	Shares with WBAL
WDRC	Hartford. T—Bloomfield	Doolittle Radio Corporation	500W	1330	Unlimited.
WCAC	Storrs	Connecticut Agricultural College	250W	600	Shares with WGBS.
		DELAWARE			
WDEL	Wilmington	WDEL (Inc.)	250W 350W–LS [6]	1120	Unlimited.
WILM	Wilmington. T—Edge Moor.	Delaware Broadcasting Co. (Inc.)	100W	1420	Do.
		DISTRICT OF COLUMBIA			
WOL	Washington	American Broadcasting Co	100W	1310	Unlimited.
WMAL	do	M. A. Leese	250W 500W–LS	630	Do.
WRC	do	National Broadcasting Co. (Inc.)	500W	950	Do.
		FLORIDA			
WFLA–WSUN	Clearwater	Clearwater Chamber of Commerce and St. Petersburg Chamber of Commerce.	1KW 2½KW–LS	620	Unlimited.
WRUF	Gainesville	University of Florida	5KW	830	Limited.
WJAX	Jacksonville	City of Jacksonville	1KW	900	Unlimited.
WQAM	Miami	Miami Broadcasting Co	1KW	560	Do.
WIOD–WMBF	Miami. T—Miami Beach	Isle of Dreams Broadcasting Corporation.	1KW	1300	Do.
WDBO	Orlando	Orlando Broadcasting Co. (Inc.)	500W 1KW–LS	1120	One-half time.

WCOA	Pensacola	City of Pensacola, Fla	500W	1340	Unlimited.
WDAE	Tampa	Tampa Publishing Co	1KW	1220	Do.
WMBR	do	F. J. Reynolds	100W	1370	Do.
		GEORGIA			
WGST	Atlanta	Georgia School of Technology	250W 500W-LS	890	Shares with WMAZ.
WSB	do	Atlanta Journal Co	5KW	740	Unlimited.
WRDW	Augusta	Musicove (Inc.)	100W	1500	Do.
WRBL	Columbus	David Parmer	50W	1200	Do.
WMAZ	Macon	Macon Junior Chamber of Commerce.	250W 500W-LS	890	Shares with WGST.
WFDV	Rome	Dolies Goings	100W	1370	Unlimited.
WTOC	Savannah	Savannah Broadcasting Co. (Inc.)	500W	1260	Do.
WQDX	Thomasville	Stevens Luke	50W	1210	Do.
WRBI	Tifton	Charles A. and Milton U. Kent, doing business as Kent's Furniture & Music Store.	20W [7]	1310	One-half time.
WTFI	Toccoa	Toccoa Falls Institute	500W	1450	Unlimited.
		HAWAII			
KGU	Honolulu	Marion A. Mulrony and Advertiser Publishing Co. (Ltd.).	1KW	940	Unlimited.
KGMB	do	Honolulu Broadcasting Co. (Ltd.)	500W	1320	Do.
		IDAHO			
KIDO	Boise	Frank L. Hill and C. G. Phillips, doing business as Boise Broadcast Station.	1KW	1250	Unlimited.
KID	Idaho Falls	KID Broadcasting Co	250W 500W-LS	1320	Shares with KTFI at night.
KFXD	Nampa	Frank E. Hurt, trading as Service Radio Co.	50W	1420	Unlimited.
KSEI	Pocatello	KSEI Broadcasting Association (Inc.).	250W	900	Do.
KGKX	Sandpoint	C. E. Twiss and F. H. McCann	100W	1420	Do.
KTFI	Twin Falls	Radio Broadcasting Corporation	250W [8]	1320	Shares with KID at night.

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[6] C. P. to increase power to 500 watts-L.S.

[7] C. P. to increase power to 100 watts.

C. P. to increase power to 500 watts-LS

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		ILLINOIS			
WCAZ	Carthage	Superior Broadcasting Service (Inc.).	50W	1070	Daytime.
KYW-KFKX	Chicago. T—Bloomingdale Township.	Westinghouse Electric & Manufacturing Co.	10KW	1020	Unlimited.
WAAF	Chicago	Drovers Journal Publishing Co	500W	920	Daytime.
WBBM-WJBT	Chicago. T—Glenview	Atlass Co. (Inc.)	25KW	770	Shares with KFAB
WCFL	Chicago	Chicago Federation of Labor	1½KW	970	Limited.
WCRW	do	Clinton R. White	100W	1210	Shares with WEDC and WSBC.
WEDC	do	Emil Denemark (Inc.)	100W	1210	Shares with WCRW and WSBC.
WENR-WBCN	Chicago. T—Downers Grove.	Great Lakes Broadcasting Co	50KW-LP	870	Shares with WLS.
WGES	Chicago	Oak Leaves Broadcasting Station (Inc.).	500W 1KW-LS [9]	1360	Shares with WJKS.
WGN-WLIB	Chicago. T—Elgin	The Tribune Co	25KW	720	Unlimited.
WIBO	Chicago. T—Desplaines	Nelson Bros. Bond & Mortgage Co	1KW 1½KW-LS	560	Shares with WPCC and WISJ.[10]
WKBI	Chicago	Fred L. Schoenwolf	100W	1420	Shares with WEHS and WHFC.
WLS	Chicago. T—Crete	Agricultural Broadcasting Co	5KW [11]	870	Shares with WENR and WBCN.
WMAQ	Chicago. T—Addison	WMAQ (Inc.)	5KW	670	Unlimited.
WMBI	do do	The Moody Bible Institute Radio Station.	5KW	1080	Limited. Shares with WCBD.
WCHI	Chicago. T—Batavia	People's Pulpit Association	5KW	1490	Shares with WJAZ and WCKY.
WPCC	Chicago	North Shore Church	500W	560	Shares with WIBO and WISJ. [12]
WSBC	do	World Battery Co. (Inc.)	100W	1210	Shares with WEDC and WCRW.

WHFC	Cicero	Triangle Broadcasters	100W	1420	Shares with WEHS and WKBI.
WJBL	Decatur	Commodore Broadcasting (Inc.)	100W	1200	Shares with WJBC.
WEHS	Evanston	WEHS (Inc.)	100W	1420	Shares with WHFC and WKBI.
WKBS	Galesburg	Permil N. Nelson	100W	1310	Unlimited.
WEBQ	Harrisburg	First Trust & Savings Bank of Harrisburg.	100W	1210	Shares with KFVS.
WCLS	Joliet	WCLS (Inc.)	100W	1310	Shares with WKBB.
WKBB	do	Sanders Bros. Radio Station	100W	1310	Shares with WCLS.
WJBC	La Salle	Wayne Hummer and H. J. Dee, doing business as Kaskaskia Broadcasting Co.	100W	1200	Shares with WJBL.
WJJD	Mooseheart	Supreme Lodge of World Loyal Order of Moose.	20KW	1130	Limited.
WJAZ	Mount Prospect	Zenith Radio Corporation	5KW	1490	Shares with WCHI and WCKY.
WMBD	Peoria Heights	E. M. Kahler (owner Peoria Heights Radio Laboratory).	500W 1KW–LS	1440	Shares with WTAD.
WTAD	Quincy	Illinois Stock Medicine Broadcasting Corporation.	500W	1440	Shares with WMBD.
WHBF	Rock Island	Beardsley Specialty Co	100W	1210	Unlimited.
KFLV	Rockford	Rockford Broadcasters (Inc.)	500W	1410	Shares with WHBL.
WCBS	Springfield	Charles H. Messter and Harold L. Dewing.	100W	1210	Shares with WTAX.
WTAX	do	Williams Hardware Co	100W	1210	Shares with WCBS.
WDZ	Tuscola	James L. Bush	100W	1070	Daytime.
WILL	Urbana	University of Illinois	250W 500W–LS	890	Shares with KFNF and KUSD.
WCBD	Zion	Wilbur Glenn Voliva	5KW	1080	Limited. Shares with WMBI.
		INDIANA			
WHBU	Anderson	Citizens Bank	100W	1210	Unlimited.
WKBV	Connersville	William O. Knox, trading as Knox Battery & Electric Co.	100W 150W–LS	1500	Do.
WCMA	Culver	General Broadcasting Corporation	500W	1400	Shares with WBAA and WKBF.

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[9] On Sunday.

[10] WISJ temporarily operating on 780 kilocycles.

[11] C. P. to increase power to 50 KW–LP.

[12] WISJ temporarily operating on 780 kilocycles.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		INDIANA—Continued			
WGBF	Evansville	Evansville on the Air (Inc.)	500W	630	Shares with WOS and KFRU.
WGL	Fort Wayne	Fred C. Zieg (Allen-Wayne Co.)	100W	1370	Unlimited.
WOWO	do	Main Auto Supply Co	10KW	1160	Shares with WWVA.
WJKS	Gary	Johnson-Kennedy Radio Corporation.	1KW 1¼KW-LS	1360	Shares with WGES.
WWAE	Hammond	Hammond-Calumet Broadcasting Corporation.	100W	1200	Shares with WRAF.
WFBM	Indianapolis	Indianapolis Power & Light Co	1KW	1230	Shares with WSBT.
WKBF	Indianapolis. T—Clermont.	Indianapolis Broadcasting (Inc.)	500W	1400	Shares with WBAA and WCMA.
WRAF	La Porte	Charles Middleton	100W	1200	Shares with WWAE.
WJAK	Marion	Marion Broadcast Co	50W	1310	Shares with WLBC.
WLBC	Muncie	Donald A. Burton	50W	1310	Shares with WJAK.
WSBT	South Bend	South Bend Tribune	500W	1230	Shares with WFBM.
WBOW	Terre Haute	Banks of Wabash (Inc.)	100W	1310	Unlimited.
WBAA	West Lafayette	Purdue University	500W 1KW-LS	1400	Shares with WCMA and WKBF.
		IOWA			
WOI	Ames	Iowa State College of Agriculture and Mechanic Arts.	5KW	640	Daytime.
KFGQ	Boone	Boone Biblical College	100W	1310	Shares with KFJY and KWCR.
KWCR	Cedar Rapids	Harry F. Paar	100W	1310	Shares with KFJY and KFGQ.
KSO	Clarinda	Berry Seed Co	500W	1380	Shares with WKBH.
KOIL	Council Bluffs	Mona Motor Oil Co	1KW	1260	Unlimited.
WOC	Davenport	Central Broadcasting Co	5KW	1000	Synchronizes with WHO experimentally.
KGCA	Decorah	Charles W. Greenley	50W	1270	Daytime. Shares with KWLC.
KWLC	do	Luther College	100W	1270	Daytime. Shares with KGCA.

WHO	Des Moines	Central Broadcasting Co	5KW	1000	Synchronizes with WOC experimentally.
KFJY	Fort Dodge	C. S. Tunwall	100W	1310	Shares with KFGQ and KWCR.
WSUI	Iowa City	State University of Iowa	500W	880	Three-sevenths time.
KFJB	Marshalltown	Marshall Electric Co. (Inc.)	100W 250W-LS	1200	One-half time.
KTNT	Muscatine	Norman Baker	5KW	1170	Limited.
WIAS	Ottumwa	Iowa Broadcasting Co	100W	1420	Unlimited.
KICK	Red Oak	Red Oak Radio Corporation	100W	1420	Do.
KFNF	Shenandoah	Henry Field Co	500W 1KW-LS	890	Shares with WILL and KUSD.
KMA	do	May Seed & Nursery Co	500W 1KW-LS	930	Shares with KGBZ.
KSCJ	Sioux City	Perkins Bros. Co	1KW 2½KW-LS	1330	Shares with WTAQ.
WMT	Waterloo	Waterloo Broadcasting Co	500W	600	Unlimited.
		KANSAS			
KGNO	Dodge City	Dodge City Broadcasting Co (Inc.)	100W	1210	Unlimited.
WLBF	Kansas City	The WLBF Broadcasting Co	100W	1420	Do.
KFKU	Lawrence	University of Kansas	500W	1220	Shares with WREN.
WREN	do	Jenny Wren Co	1KW	1220	Shares with KFKU.
KSAC	Manhattan	Kansas State Agricultural College	500W 1KW-LS	580	Shares with WIBW.
KFKB	Milford	The KFKB Broadcasting Association (Inc.).	5KW	1050	Limited.
WIBW	Topeka	Topeka Broadcasting Association (Inc.).	1KW [13]	480	Shares with KSAC.
KFH	Wichita	Radio Station KFH Co	1KW	1300	Shares with WOQ.
		KENTUCKY			
WCKY	Covington. T—Crescent Springs.	L. B. Wilson (Inc.)	5KW	1490	Shares with WJAZ and WCHI.
WFIW	Hopkinsville	WFIW (Inc.)	1KW	940	Unlimited.

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[13] Experimentally.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operaton
		KENTUCKY—Continued			
WHAS	Louisville. T—Jeffersontown.	The Courier-Journal and The Louisville Times Co.	10KW	820	Unlimited.
WLAP	Louisville	American Broadcasting Corporation of Kentucky.	100W 250W-LS	1200	Do.
WPAD	Paducah	Pierce E. Lackey & S. Houston McNutt, doing business as Paducah Broadcasting Co.	100W	1420	Do.
		LOUISIANA			
KMLB	Monroe	J. C. Liner	50W	1200	Daytime.
WABZ	New Orleans	Coliseum Place Baptist Church	100W	1200	Shares with WJBW.
WDSU	New Orleans. T—Gretna	Joseph H. Uhalt	1KW	1250	Unlimited.
WJBO	New Orleans	Valdemar Jensen	100W	1420	Do.
WJBW	do	C. Carlson	30W[14]	1200	Shares with WABZ.
WSMB	do	Saenger Theaters (Inc.) and Maison Blanche Co.	500W	1320	Unlimited.
WWL	do	Loyola University	5KW	850	Shares with KWKH.
KRMD	Shreveport	Robert M. Dean	50W	1310	Shares with KTSL.
KTBS	do	Tri State Broadcasting System (Inc.).	1KW	1450	Unlimited.
KTSL	do	G. A. Houseman	100W	1310	Shares with KRMD.
KWEA	do	Hello World Broadcasting Corporation.	100W	1210	Unlimited.
KWKH	Shreveport. T—Kennonwood.	do	10KW	850	Shares with WWL.
		MAINE			
WRDO	Augusta	Albert S. Woodman	100W	1370	Unlimited (C. P. only).
WABI	Bangor	Pine Tree Broadcasting Corporation.	100W	1200	Unlimited.

WLBZ	do	Maine Broadcasting Co. (Inc.)	500W	620	Do.
WCSH	Portland. T—Scarboro	Congress Square Hotel Co	1KW	940	Do.

MARYLAND

WBAL	Baltimore. T—Glen Morris.	Consolidated Gas Electric Light & Power Co. of Baltimore.	10KW	1060	Shares with WTIC.
WCAO	Baltimore	Monumental Radio (Inc.)	250W	600	Unlimited.
WCBM	do	Baltimore Broadcasting Corporation.	100W 250W–LS	1370	Do.
WFBR	do	Baltimore Radio Show (Inc.)	500W	1270	Do.
WTBO	Cumberland	Associated Broadcasting Corporation.	100W 250W–LS	1420	Do.

MASSACHUSETTS

WBZA	Boston [15]	Westinghouse Electric and Manufacturing Co.	500W	990	Shares with WBZ.
WEEI	Boston. T—Weymouth	Edison Electric Illuminating Co. of Boston.	1KW	590	Unlimited.
WHDH	Boston. T—Gloucester	Matheson Radio Co. (Inc.)	1KW	830	Daytime until sunset at Denver, Colo.
WLOE	Boston. T—Chelsea	Boston Broadcasting Co	100W 250W–LS	1500	One-half time.
WNAC–WBIS	Boston. T—Quincy	Shepard Broadcasting Service (Inc.).	1KW	1230	Unlimited.
WSSH	Boston	Tremont Temple Baptist Church	500W	1410	Shares with WLEX and WMAF.
WSAR	Fall River	Doughty and Welch Electric Co. (Inc.).	250W	1450	Unlimited.
WLEX	Lexington	Bay State Broadcasting Corporation.	500W	1410	Shares with WMAF and WSSH.
WLEY	do	Carl S. Wheeler, trading as The Lexington Air Stations.	100W 250W–LS	1370	One-half time.
WBSO	Needham	Babson's Statistical Organization (Inc.).	500W	920	Daytime.

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[14] C. P. to increase power to 100 watts.

[15] C. P. to move transmitter to East Springfield, Mass., and increase power to 1 kilowatt.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		MASSACHUSETTS—Con.			
WNBH	New Bedford. T—Fairhaven.	Irving Vermilya, trading as New Bedford Broadcasting Co.	100W	1310	Unlimited.
WMAF	South Dartmouth	Round Hills Radio Corporation	500W	1410	Shares with WLEX and WSSH.
WBZ	Springfield. T—East Springfield.[16]	Westinghouse Electric & Manufacturing Co.	15KW	990	Shares with WBZA.
WORC-WEPS	Worcester. T—Auburn	Alfred Frank Kleindienst	100W	1200	Unlimited.
WTAG	Worcester	Worcester Telegram Publishing Co. (Inc.).	250W	580	Do.
		MICHIGAN			
WELL	Battle Creek	Enquirer-News Co	50W [17]	1420	Unlimited.
WBCM	Bay City. T—Hampton Township.	James E. Davidson	500W	1410	Do.
WKZO	Berrien Springs	WKZO (Inc.)	1KW	590	Daytime.
WHDF	Calumet	Upper Michigan Broadcasting Co	100W 250W-LS	1370	Unlimited.
WXYZ	Detroit	Kunsky-Trendle Broadcasting Corporation.	1KW	1240	Do.
WJR	Detroit. T—Sylvan Lake Village.	WJR, The Goodwill Station (Inc.)	5KW	750	Do.
WMBC	Detroit	Michigan Broadcasting Co	100W 250W-LS	1420	Do.
WWJ	do	The Evening News Association (Inc.).	1KW	920	Do.
WKAR	East Lansing	Michigan State College	1KW	1040	Daytime.
WFDF	Flint	Frank D. Fallain	100W	1310	Unlimited.
WASH	Grand Rapids	WASH Broadcasting Corporation	500W	1270	Shares with WOOD.
WOOD	Grand Rapids. T—Furnwood.	Walter B. Stiles (Inc.)	500W	1270	Shares with WASH.

WJBK	Highland Park	James F. Hopkins (Inc.)	50W	1370	Shares with WIBM.
WIBM	Jackson	WIBM (Inc.)	100W	1370	Shares with WJBK.
WMPC	Lapeer	First Methodist Protestant Church of Lapeer.	100W	1500	Unlimited.
WKBZ	Ludington	K. L. Ashbacker	50W	1500	Do.
WBEO	Marquette	Chas. C. MacLeod	100W	1310	Unlimited (C. P. only).
WEXL	Royal Oak	Royal Oak Broadcasting Co	50W	1310	Unlimited.

MINNESOTA

KGDE	Fergus Falls	Chas. L. Jaren	100W 250W–LS	1200	Unlimited.
WCCO	Minneapolis. T—Anoka	Northwestern Broadcasting (Inc.)	7½KW	810	Do.
WDGY	Minneapolis	Dr. George W. Young	1KW	1180	Limited. Shares with WHDI.
WHDI	do	Wm. Hood Dunwoody Industrial Institute.	500W	1180	Limited. Shares with WDGY.
WLB-WGMS	Minneapolis. T—St. Paul	University of Minnesota	1KW	1250	Shares with WCAL, KFMX, and WRHM.
WRHM	Minneapolis. T—Fridley	Minnesota Broadcasting Corporation.	1KW	1250	Shares with WLB, KFMX, and WCAL.
KGFK	Moorhead	Red River Broadcasting Co. (Inc.)	50W	1500	Unlimited.
KFMX	Northfield	Carleton College	1KW	1250	Shares with WLB, WCAL, and WRHM.
WCAL	do	St. Olaf College	1KW	1250	Shares with WLB, KFMX, and WRHM.
KSTP	St. Paul. T-Westcott	National Battery Broadcasting Co	10KW	1460	Unlimited.

MISSISSIPPI

WRBQ	Greenville	J. Pat Scully	100W 250W–LS	1210	Unlimited.
WGCM	Gulfport. T—Mississippi City.	Great Southern Land Co	100W	1210	Do.
WRBJ	Hattiesburg	Woodruff Furniture Co. (Inc.)	10W	1370	Do.
WJDX	Jackson	Lamar Life Insurance Co	1KW	1270	Do.
WCOC	Meridian	Mississippi Broadcasting Co. (Inc.)	500W 1KW–LS	880	Do.
WDIX	Tupelo	North Mississippi Broadcasting Corporation.	100W	1500	Do.
WQBC	Vicksburg	Delta Broadcasting Co. (Inc.)	300W	1360	Daytime (C. P. only).

[16] C. P. to move transmitter to Millis Township, Mass., studio to Boston, Mass. and consolidate with WBZA.
[17] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		MISSOURI			
KFVS	Cape Girardeau	Oscar C. Hirsch, trading as Hirsch Battery & Radio Co.	100W	1210	Shares with WEBQ.
KFUO	Clayton	Evangelical Lutheran Synod of Missouri, Ohio and other States. Rev. R. Kretzschmar, Chairman, Board of Control of Concordia Seminary.	500W 1KW–LS	550	Shares with KSD.
KFRU	Columbia	Stephens College	500W	630	Shares with WOS and WGBF.
KGIZ	Grant City	Grant City Park Corporation	50W[18]	1500	Unlimited.
WOS	Jefferson City	Missouri State Marketing Bureau.	500W	630	Shares with KFRU and WGBF
WMBH	Joplin	Edwin Dudley Aber	100W 250W–LS	1420	Unlimited.
KMBC	Kansas City. T—Independence.	Midland Broadcasting Co	1KW	950	Do.
KWKC	Kansas City	Wilson Duncan, trading as Wilson Duncan Broadcasting Co.	100W	1370	One-half time.
WDAF	do	Kansas City Star Co	1KW	610	Unlimited.
WHB	Kansas City. T—North Kansas City.	WHB Broadcasting Co	500W	860	Daytime.
WOQ	Kansas City	Unity School of Christianity	1KW	1300	Shares with KFH.
KFEQ	St. Joseph	Scroggin & Co. Bank	2½KW	680	Daytime, 6 a. m. to local sunset.
KGBX	do	KGBX (Inc.)	100W	1310	Unlimited.
KFWF	St. Louis	St. Louis Truth Center (Inc.)	100W	1200	Shares with WIL.
KMOX	do	Voice of St. Louis (Inc.)	50KW–LP	1090	Unlimited.
KSD	do	Pulitzer Publishing Co	500W	550	Shares with KFUO.
KWK	St. Louis. T—Kirkwood	Greater St. Louis Broadcasting Corporation.	1KW	1350	Unlimited.
WEW	St. Louis	St. Louis University	1KW	760	Daytime.
WIL	do	Missouri Broadcasting Corporation.	100W 250W–LS	1200	Shares with KFWF.

		MONTANA			
KGHL	Billings	Northwestern Auto Supply Co. (Inc.).	1KW	950	Unlimited.
KGIR	Butte	KGIR (Inc.)	500W	1360	One-half time.
KFBB	Great Falls	Buttrey Broadcast (Inc.)	1KW 2½KW-LS	1280	Unlimited.
KGEZ	Kalispell	Donald C. Treloar and Stanley R. Church, doing business as Treloar-Church Broadcasting Co.	100W	1310	Do.
KGVO	Missoula	Mosby's (Inc.)	100W	1420	10 a. m. to 6 p. m. (C. P. only).
KGCX	Wolf Point	First State Bank of Vida	100W 250W-LS	1310	One-half time.
		NEBRASKA			
KMMJ	Clay Center	The M. M. Johnson Co	1KW	740	Limited.
KFOR	Lincoln	Howard A. Shuman	100W 250W-LS	1210	Unlimited
KFAB	do	KFAB Broadcasting Co	5KW	770	Shares with WBBM-WJBT.
WCAJ	do	Nebraska Wesleyan University	500W [19]	590	Shares with WOW.
WJAG	Norfolk	Norfolk Daily News	1KW	1060	Limited.
KGNF	North Platte	Herbert Logan Spencer	500W	1430	Daytime.
WAAW	Omaha	Omaha Grain Exchange	500W	660	Do.
WOW	do	Woodmen of the World Life Insurance Association.	1KW	590	Shares with WCAJ.
KGFW	Ravenna	Central Nebraska Broadcasting Corporation.	100W	1310	Unlimited.
KGKY	Scottsbluff	Hilliard Company (Inc.)	100W	1500	Do.
KGBZ	York	Dr. George R. Miller	500W 1KW-LS	930	Shares with KMA.
		NEVADA			
KGIX	Las Vegas	J. M. Heaton	100W	1420	Unlimited.
KOH	Reno	Jay Peters (Inc.)	500W	1380	Do.
		NEW HAMPSHIRE			
WKAV	Laconia	Laconia Radio Club	100W	1310	Unlimited.

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[18] C. P. to increase power to 100 watts.

[19] C. P. to decrease power to 250 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		NEW JERSEY			
WCAP	Asbury Park	Radio Industries Broadcasting Co.	500W	1280	Shares with WCAM and WOAX.
WPG	Atlantic City	WPG Broadcasting Corporation	5KW	1100	Shares with WLWL.
WCAM	Camden	City of Camden	500W	1280	Shares—with WCAP and WOAX.
WBMS	Hackensack	WBMS Broadcasting Corporation	250W	1450	Shares with WHOM, WKBO, and WNJ.
WAAT	Jersey City	Bremer Broadcasting Corporation	300W	940	Daytime until 6 p. m., eastern standard time.
WHOM	do	New Jersey Broadcasting Corporation.	250W	1450	Shares with WBMS, WKBO, and WNJ.
WKBO	do	Camith Corporation	250W	1450	Shares with WBMS, WHOM, and WNJ.
WAAM	Newark	WAAM (Inc.)	1KW 2KW–LS[20]	1250	Shares with WGCP and WODA.
WGCP	do	May Radio Broadcast Corporation	250W	1250	Shares with WODA and WAAM.
WNJ	do	Radio Investment Co. (Inc.)	250W	1450	Shares with WHOM WKBO, and WBMS.
WOR	Newark. T—Kearny	Bamberger Broadcasting Service (Inc.).	5KW	710	Unlimited.
WODA	Paterson	Richard E. O'Dea	1KW	1250	Shares with WGCP and WAAM.
WJBI	Red Bank	Monmouth Broadcasting Co	100W	1210	Shares with WMRJ, WGBB, and WCOH.
WOAX	Trenton	WOAX (Inc.)	500W	1280	Shares with WCAM and WCAP.
WAWZ	Zarephath	Pillar of Fire	250W	1350	Shares with WMSG, WCDA, and WBNX (C. P. only).

NEW MEXICO

KGGM	Albuquerque	New Mexico Broadcasting Co.	250W 500W-LS	1230	Unlimited.
KGFL	Raton	W. E. Whitmore	50W	1370	Do.
KOB	State College	New Mexico College of Agriculture and Mechanic Arts.	20KW	1180	Shares with KEX.

NEW YORK

WMBO	Auburn	George I. Stevens, trading as Radio Service Laboratories.	100W	1310	Unlimited.
WNBF	Binghamton	Howitt-Wood Radio Co. (Inc.)	100W	1500	Do.
WBBC	Brooklyn	Brooklyn Broadcasting Corporation.	500W	1400	Shares with WCGU, WLTH, and WFOX.
WBBR	Brooklyn. T—Rossville	People's Pulpit Association	1KW	1300	Shares with WHAP, WEVD, and WHAZ.
WCGU	Brooklyn	U. S. Broadcasting Corporation	500W	1400	Shares with WFOX, WLTH, and WBBC.
WCLB	do	Arthur Faske	100W	1500	Shares with WWRL, WMBQ, and WLBX (C. P. only).
WFOX	do	Paramount Broadcasting Corporation.	500W	1400	Shares with WCGU, WLTH, and WBBC.
WLTH	do	Voice of Brooklyn (Inc.)	500W	1400	Shares with WCGU, WBBC, and WFOX.
WMBQ	do	Paul J. Gollhofer	100W	1500	Shares with WLBX, WCLB, and WWRL.
WBEN	Buffalo. T—Martinsville.	Edward H. Butler, trustee for Ada Butler Mitchell and Edward H. Butler, doing business as Buffalo Evening News.	1KW	900	Unlimited.
WEBR	Buffalo	Howell Broadcasting Co. (Inc.)	100W 200W-LS	1310	Do.
WGR	Buffalo. T—Amherst	Buffalo Broadcasting Corporation	1KW	550	Do.
WKBW	do do	WKBW (Inc.)	5KW	1480	Do.
WMAK	Buffalo. T-Grand Island.[21]	Buffalo Broadcasting Corporation	1KW	1040	Limited.

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[20] C. P. to increase power to 2½ KW-LS.
[21] C. P. to move transmitter to Amherst, N. Y.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		NEW YORK—Continued			
WSVS	Buffalo	Seneca Vocational High School (Elmer S. Pierce, principal).	50W	1370	Unlimited.
WCAD	Canton	St. Lawrence University	500W	1220	Daytime.
WGBB	Freeport	Harry H. Carman	100W	1210	Shares with WMRJ, WJBI, and WCOH.
WBGF	Glens Falls	W. Neal Parker and Herbert H. Metcalfe.	50W	1370	Unlimited.
WEAI	Ithaca	Cornell University	1KW	1270	Daytime.
WLCI	do.	Lutheran Association of Ithaca, N. Y.	50W	1210	Unlimited.
WMRJ	Jamaica	Peter J. Prinz	100W	1210	Shares with WGBB, WJBI, and WCOH.
WOCL	Jamestown	A. E. Newton	25W	1210	Unlimited.
WLBX	Long Island City	John N. Brahy	100W	1500	Shares with WMBQ, WCLB, and WWRL.
WABC–WBOQ	New York. T—West of Cross Bay Boulevard, Queens County, N. Y.[22]	Atlantic Broadcasting Corporation.	5KW	860	Unlimited.
WBNX	New York	Standard Cahill Co. (Inc.)	250W	1350	Shares with WAWZ, WMSG, and WCDA.
WCDA	New York. T—Cliffside, N. J.	Italian Educational Broadcasting Co. (Inc.).	250W	1350	Shares with WAWZ, WMSG, and WBNX.
WEAF	New York. T—Bellmore	National Broadcasting Co. (Inc.)	50KW–LP	660	Unlimited.
WEVD	New York. T—Forest Hills.	Debs Memorial Radio Fund (Inc.)	500W	1300	Shares with WBBR, WHAP, and WHAZ.
WGBS	New York. T—Astoria, Long Island.	General Broadcasting System (Inc.).	250W 500W–LS[23]	600	Shares with WCAC.
WHAP	New York. T—Carlstadt, N. J.	Defenders of Truth Society (Inc.)	1KW	1300	Shares with WBBR, WEVD, and WHAZ.
WHN	New York	Marcus Loew Booking Agency	250W	1010	Shares with WRNY and WQAO–WPAP.

WJZ	New York. T—Bound Brook, N. J.	National Broadcasting Co. (Inc.)	30KW–LP	760	Unlimited.
WLWL	New York. T—Kearny, N. J.	Missionary Society of St. Paul the Apostle.	5KW	1100	Shares with WPG.
WMCA	New York. T—Hoboken, N. J.	Knickerbocker Broadcasting Co. (Inc.).	500W	570	Shares with WNYC.
WMSG	New York	Madison Square Garden Broadcast Corporation.	250W	1350	Shares with WAWZ, WCDA, and WBNX.
WNYC	do	City of New York, Department of Plant and Structures.	500W	570	Shares with WMCA.
WOV	New York. T—Secaucus, N. J.	International Broadcasting Corporation.	1KW	1130	Daytime to 6 p. m.
WPCH	New York. T—Hoboken, N. J.	Eastern Broadcasters (Inc.)	500W	810	Daytime.
WQAO–WPAP	New York. T—Cliffside, N. J.	Calvary Baptist Church	250W	1010	Shares with WRNY and WHN.
WRNY	New York. T—Coytesville, N. J.	Aviation Radio Station (Inc.)	250W	1010	Shares with WHN and WQAO–WPAP.
WPOE	Patchogue	Nassau Broadcasting Corporation	100W	1370	Unlimited.
WOKO	Poughkeepsie. T—Mount Beacon.[24]	WOKO (Inc.)	500W	1440	Shares with WHEC–WABO.
WHAM	Rochester. T—Victor Township.	Stromberg-Carlson Telephone Manufacturing Co.	5KW	1150	Unlimited.
WHEC–WABO	Rochester	Hickson Electric & Radio Corporation.	500W	1440	Shares with WOKO.
WNBZ	Saranac Lake	Earl J. Smith and William Mace, doing business as Smith & Mace.	50W	1290	Daytime.
WGY	Schenectady. T—South Schenectady.	General Electric Co	50KW	790	Unlimited.
WFBL	Syracuse [25]	Onondago Radio Broadcasting Corporation.	1KW	1360	Do.
WSYR–WMAC	Syracuse	Clive B. Meredith	250W	570	Do.
WHAZ	Troy	Rensselaer Polytechnic Institute	500W	1300	Shares with WBBR, WHAP, and WEVD.
WHDL	Tupper Lake	Tupper Lake Broadcasting Co. (Inc.).	10W [26]	1420	Daytime.

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[22] C. P. to move transmitter to Wayne, N. J., and increase power to 50 KW-LP.

[23] Experimentally.

[24] C. P. to move transmitter and studio to Albany, N Y.

[25] C. P. to move transmitter to Collamer, N. Y. and increase power to 2½ KW-LS.

[26] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		NEW YORK—Continued			
WIBX	Utica	WIBX (Inc.)	100W 300W–LS	1200	Unlimited.
WWRL	Woodside	Long Island Broadcasting Corporation.	100W	1500	Shares with WMBQ, WLBX, and WCLB.
WCOH	Yonkers. T—Greenville	Westchester Broadcasting Corporation.	100W	1210	Shares with WJBI, WGBB, and WMRJ.
		NORTH CAROLINA			
WWNC	Asheville	Citizens Broadcasting Co. (Inc.)	1KW	570	Unlimited.
WBT	Charlotte	Station WBT (Inc.)	5KW	1080	Do.
WSOC	Gastonia	WSOC (Inc.)	100W	1210	Do.
WBIG	Greensboro	North Carolina Broadcasting Co. (Inc.).	500W	1440	Do.
WPTF	Raleigh	Durham Life Insurance Co	1KW	680	Limited.
WRBT	Wilmington	Wilmington Radio Association (Inc.)	100W	1370	Unlimited.
WSJS	Winston-Salem	Winston-Salem Journal Co	100W	1310	Do.
		NORTH DAKOTA			
KFYR	Bismarck	Meyer Broadcasting Co	1KW 2½KW–LS[27]	550	Shares with KFDY.
KDLR	Devils Lake	KDLR (Inc.)	100W	1210	Unlimited.
WDAY	Fargo. T—West Fargo	WDAY (Inc.)	1KW	940	Do.
KFJM	Grand Forks	University of North Dakota	100W	1370	Do.
KGCU	Mandan	Mandan Radio Association	100W	1200	Do.
KLPM	Minot	John B. Cooley	100W	1420	Do.

OHIO

WHBC	Canton	St. John's Catholic Church	10W	1200	Shares with WNBO on Sundays.
WFBE	Cincinnati	Radio station WFBE (Inc.)	100W 250W–LS	1200	Unlimited.
WKRC	do	WKRC (Inc.)	1KW	550	Do.
WLW	Cincinnati. T—Mason	Crosley Radio Corporation	50KW–LP	700	Do.
WSAI	do do	Crosley Radio Corporation (lessee)	500W	1330	Do.
WGAR	Cleveland	The WGAR Broadcasting Co	500W	1450	Do.
WJAY	do	Cleveland Radio Broadcasting Corporation.	500W	610	Daytime.
WHK	Cleveland. T—Seven Hills.	Radio Air Service Corporation	1KW	1390	Unlimited.
WTAM	Cleveland. T—Brecksville Village.	National Broadcasting Co. (Inc.)	50KW–LP	1070	Do.
WAIU	Columbus	American Insurance Union	500W	640	Limited.
WCAH	do	Commercial Radio Service Co	500W	1430	Shares with WHP and WBAK.
WEAO	do	Ohio State University	750W	570	Shares with WKBN.
WSEN	do	Columbus Broadcasting Corporation.	100W	1210	Unlimited.
WSMK	Dayton	Stanley M. Krohn, jr	200W	1380	Shares with KQV at night.
WJW	Mansfield	John F. Weimer, owner, Mansfield Broadcasting Association.	100W	1210	Unlimited.
WHBD	Mount Orab	F. P. Moler	100W	1370	Do.
WIBR	Steubenville	Geo. W. Robinson	50W	1420	One-half time.
WADC	Tallmadge	Allen T. Simmons	1KW	1320	Unlimited.
WSPD	Toledo	Toledo Broadcasting Co	500W 1KW–LS	1340	Do.
WKBN	Youngstown	Warren P. Williamson, jr	500W	570	Shares with WEAO.
WALR	Zanesville	Roy W. Waller	100W	1210	Unlimited.

OKLAHOMA

KGFF	Alva [28]	D. R. Wallace, owner, KGFF Broadcasting Co.	100W	1420	Unlimited.
KOCW	Chickasha	Oklahoma College for Women	250W 500W–LS	1400	Do.

[27] Experimentally.

[28] C. P. to move transmitter and studio to Shawnee, Okla.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		OKLAHOMA—Continued.			
KGMP	Elk City	F. Homer Bryant, trading as Bryant Radio & Electric Co.	100W	1210	Unlimited.
KCRC	Enid	Champlin Refining Co	100W 250W-LS	1370	Shares with KGFG.
WNAD	Norman	University of Oklahoma	500W	1010	Shares with KGGF.
KFJF	Oklahoma City	National Radio Manufacturing Co	5KW	1480	Unlimited.
KFXR	do	Exchange Avenue Baptist Church	100W 250W-LS	1310	Do.
KGFG	do	Oklahoma Broadcasting Co. (Inc.)	100W	1370	Shares with KCRC.
WKY	do	WKY Radiophone Co	1KW	900	Unlimited.
WBBZ	Ponca City	C. L. Carrell	100W	1200	Do.
KGGF	South Coffeyville	Hugh J. Powell and Stanley Platz, doing business as Powell & Platz	500W	1010	Shares with WNAD.
KVOO	Tulsa	Southwestern Sales Corporation	5KW	1140	Shares with WAPI.
		OREGON			
KFJI	Astoria	KFJI Broadcasters (Inc.)	100W	1370	Unlimited.
KOAC	Corvallis	Oregon State Agricultural College	1KW	550	Do.
KORE	Eugene	Frank L. Hill and C. G. Phillips, doing business as Eugene Broadcast Station.	100W	1420	Do.
KOOS	Marshfield	H. H. Hanseth (Inc.)	100W	1370	Do.
KMED	Medford	Mrs. W. J. Virgin	50W	1310	Do.
KBPS	Portland	Benson Polytechnic School	100W	1420	Shares with KXL.
KEX	do	Western Broadcasting Co	5KW	1180	Shares with KOB.
KFJR	do	Ashley C. Dixon, trading as Ashley C. Dixon & Son.	500W	1300	Shares with KTBR.
KGW	do	Oregonian Publishing Co	1KW	620	Unlimited.
KOIN	Portland. T-Sylvan	KOIN (Inc.)	1KW	940	Do.
KTBR	Portland	M. E. Brown	500W	1300	Shares with KFJR.

KWJJ	do	KWJJ Broadcast Co. (Inc.)	500W	1060	Limited.
KXL	do	KXL Broadcasters	100W	1420	Shares with KBPS.
		PENNSYLVANIA			
WCBA	Allentown	B. Bryan Musselman	250W	1440	Shares with WSAN.
WSAN	do	Allentown Call Publishing Co. (Inc.)	250W	1440	Shares with WCBA.
WFBG	Altoona	William F. Gable Co	100W[29]	1310	Shares with WJAC.
WNBW	Carbondale	G. F. Schiessler and M. E. Stephens, doing business as Home Cut Glass & China Co.	10W	1200	Unlimited.
WIBG	Elkins Park	St. Paul's P. E. Church	50W	930	Daytime.
WEDH	Erie	Erie Dispatch-Herald Broadcasting Corporation.	100W	1420	Unlimited.
WSAJ	Grove City	Grove City College	100W	1310	Do.
WBAK	Harrisburg	Pennsylvania State Police, Commonwealth of Pennsylvania.	500W 1KW-LS	1430	Shares with WHP and WCAH
WCOD	do	Keystone Broadcasting Corporation.	100W	1200	Shares with WKJC.
WHP	Harrisburg. T—Lemoyne.	WHP (Inc.)	500W 1KW-LS	1430	Shares with WBAK and WCAH.
WJAC	Johnstown	Johnstown Automobile Co	100W	1310	Shares with WFBG.
WGAL	Lancaster	WGAL (Inc.)	100W	1310	Shares with WRAW.
WKJC	do	Kirk Johnson & Co	100W	1200	Shares with WCOD.
WJBU	Lewisburg	Bucknell University	100W	1210	Shares with WBAX.
WLBW	Oil City	Radio-Wire Program Corporation of America.	500W 1KW-LS	1260	Unlimited.
WCAU	Philadelphia. T—Byberry.	Universal Broadcasting Co	10KW	1170	Do.
WELK	Philadelphia	WELK Broadcasting Station (Inc.)	100W 250W-LS	1370	Do.
WFAN	do	Keystone Broadcasting Co	500W	610	Shares with WIP.
WFI	do	Strawbridge and Clothier	500W	560	Shares with WLIT.
WHAT	do	Independence Broadcasting Co	100W	1310	Shares with WTEL.
WIP	do	Gimbel Brothers (Inc.)	500W	610	Shares with WFAN
WLIT	do	Lit Brothers	500W	560	Shares with WFI.

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[29] C. P. to increase power to 250 watts—LS.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		PENNSYLVANIA—Continued			
WPEN	Philadelphia	Wm. Penn Broadcasting Co	100W 250W–LS	1500	Unlimited.
WRAX	do	WRAX Broadcasting Co	250W	1020	Daytime.
WTEL	do	Foulkrod Radio Engineering Co	50W [30]	1310	Shares with WHAT.
KDKA	Pittsburgh. T—Saxonburg.	Westinghouse Electric & Manufacturing Co.	50KW–LP	980	Unlimited.
KQV	Pittsburgh	Doubleday-Hill Electric Co	500W	1380	Shares with WSMK at night.
WCAE	do	Kaufman & Baer Co	1KW	1220	Unlimited.
WJAS	Pittsburgh. T—North Fayette Township.	Pittsburgh Radio Supply House	1KW 2½KW–LS	1290	Do.
WWSW	Pittsburgh	William S. Walker	100W	1500	Unlimited (C. P. only).
WRAW	Reading	Reading Broadcasting Co	50W [31]	1310	Shares with WGAL.
WGBI	Scranton	Scranton Broadcasters (Inc.)	250W	880	Shares with WQAN.
WQAN	do	E. J. Lynett, proprietor, The Scranton Times.	250W	880	Shares with WGBI.
WNBO	Silver Haven	John Brownlee Spriggs	100W	1200	Shares with WHBC on Sundays.
WPSC	State College	Pennsylvania State College	500W	1230	Daytime.
WBAX	Wilkes-Barre. T—Plains Township.	John H. Stenger, jr	100W	1210	Shares with WJBU.
WBRE	Wilkes-Barre	Louis G. Baltimore	100W	1310	Unlimited.
WRAK	Williamsport	Clarence R. Cummins	50W [32]	1370	Do.
		PORTO RICO			
WKAQ	San Juan	Radio Corporation of Porto Rico	500W	890	Unlimited.
		RHODE ISLAND			
WMBA	Newport	Leroy Joseph Beebe	100W	1500	Unlimited.
WPAW	Pawtucket	Shartenberg & Robinson Co	100W	1210	Shares with WDWF–WLSI.

WDWF-WLSI	Providence. T—Cranston.	Dutee W. Flint and The Lincoln Studios (Inc.).	100W	1210	Shares with WPAW.
WEAN	Providence	Shepard Broadcasting Service (Inc.)	250W 500W–LS	780	Unlimited.
WJAR	do	The Outlet Co	250W 400W–LS	890	Do.

SOUTH CAROLINA

WCSC	Charleston	Fred Jordon and Lewis Burk	500W	1360	Unlimited.
WIS	Columbia	South Carolina Broadcasting Co. (Inc.).	500W 1KW–LS	1010	Do.
WSPA	Spartanburg	Virgil V. Evans, trading as The Voice of South Carolina.	100W 250W–LS	1420	Do.

SOUTH DAKOTA

KFDY	Brookings	South Dakota State College	500W 1KW–LS	550	Shares with KFYR.
KGDY	Huron	Voice of South Dakota	100W	1200	Unlimited.
KGDA	Mitchell	Mitchell Broadcasting Corporation	100W	1370	Do.
KGFX	Pierre	Dana McNeil	200W	580	Daytime.
WCAT	Rapid City	South Dakota State School of Mines.	100W	1200	Unlimited.
KSOO	Sioux Falls	Sioux Falls Broadcast Association (Inc.).	2KW	1110	Limited.
KUSD	Vermillion	University of South Dakota	500W 750W–LS	890	Shares with KFNF and WILL.
KGCR	Watertown	Cutler's Radio Broadcasting Service (Inc.).	100W	1210	Unlimited.
WNAX	Yankton	The House of Gurney (Inc.)	1KW	570	Do.

TENNESSEE

WOPI	Bristol	Radiophone Broadcasting Station WOPI (Inc.).	100W	1500	Unlimited.
WDOD	Chattanooga. T—Brainerd.	WDOD Broadcasting Corporation	1KW 2½KW–LS	1280	Do.
WFBC	Knoxville	First Baptist Church	50W	1200	Do.

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[30] C. P. to increase power to 100 watts.

[31] C. P. to increase power to 100 watts.

[32] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		TENNESSEE—Continued			
WNOX	Knoxville	Sterchi Bros	1KW 2KW-LS	560	Unlimited.
WROL	do	Stuart Broadcasting Corporation	100W	1310	Do.
WGBC	Memphis	Memphis Broadcasting Co	500W	1430	Shares with WNBR.
WHBQ	do	Broadcasting Station WHBQ (Inc.)	100W	1370	Unlimited.
WMC	Memphis. T—Bartlett	Paul Dillard and Enoch Brown jr., receivers	500W 1KW-LS	780	Do.
WNBR	Memphis	Memphis Broadcasting Co	500W	1430	Shares with WGBC.
WREC-WOAN	Memphis. T—Whitehaven.	WREC (Inc.)	500W 1KW-LS	600	Unlimited.
WLAC	Nashville	Life & Casualty Insurance Co. of Tennessee.	5KW	1470	Do.
WSM	do	National Life & Accident Insurance Co.	5KW	650	Do.
WSIX	Springfield	Jack M. and Louis R. Draughon, doing business as 638 Tire & Vulcanizing Co.	100W	1210	Do.
WOBT	Union City	A. F. Tittsworth, trading as Tittsworth Radio & Music Shop.	100W 250W-LS	1310	Do.
		TEXAS			
KFYO	Abilene	T. E. Kirksey, trading as Kirksey Bros.	100W 250W-LS	1420	Unlimited.
KGRS	Amarillo	E. B. Gish (Gish Radio Service)	1KW	1410	Shares with WDAG.
WDAG	do	National Radio & Broadcasting Corporation.	250W[33]	1410	Shares with KGRS.
KUT	Austin	Rice Hotel	100W	1500	Unlimited.
KFDM	Beaumont	Magnolia Petroleum Co	500W 1KW-LS	560	Do.

KWWG	Brownsville	The Brownsville Herald Publishing Co.	500W	1260	Shares with KRGV.
KGKB	Brownwood	E. M., C. T., and E. E. Wilson doing business as Eagle Publishing Co.	100W	1500	Unlimited.
WTAW	College Station	Agricultural and Mechanical College of Texas.	500W	1120	Shares with KTRH.
KGFI	Corpus Christi	Eagle Broadcasting Co. (Inc.)	100W 250W–LS	1500	Unlimited.
KRLD	Dallas	KRLD Radio Corporation	10KW	1040	Shares with KTHS.
WFAA	Dallas. T—Grapevine	The Dallas News and Dallas Journal (A. H. Belo Corporation).	50KW–LP	800	Shares with WBAP.
WRR	Dallas	City of Dallas	500W	1280	Unlimited.
KFPL	Dublin	C. C. Baxter	100W	1310	Do.
KTSM	El Paso	W. S. Bledsoe and W. T. Blackwell	100W	1310	Shares with WDAH.
WDAH	do	E. E., C. T., E. M. and Ernest Wilson, doing business as Eagle Broadcasting Co.	100W	1310	Shares with KTSM.
KFJZ	Fort Worth	Margaret Meacham Hightower, Minnie Meacham Smith and Mary Meacham, executrices of the estate of H. C. Meacham, deceased.	100W	1370	Unlimited.
KTAT	Fort Worth. T—Birdsville.	S. A. T. Broadcast Co	1KW	1240	Shares with WACO.
WBAP	Fort Worth	Carter Publications (Inc.)	50KW–LP [34]	800	Shares with WFAA.
KFLX	Galveston	George Roy Clough	100W	1370	Unlimited.
KFUL	Galveston	Will H. Ford	500W	1290	Shares with KTSA.
KFPM	Greenville	Dave Ablowich, trading as The New Furniture Co.	15W	1310	Unlimited.
KRGV	Harlingen	KRGV (Inc.)	500W	1260	Shares with KWWG.
KPRC	Houston. T—Sugarland	Houston Printing Co	1KW 2½KW–LS	920	Unlimited.
KTLC	Houston	Houston Broadcasting Co	100W	1310	Do.
KTRH	do	Rice Hotel	500W	1120	Shares with WTAW.
KXYZ	do	Harris County Broadcast Co	100W	1420	Unlimited.
KGKL	San Angelo	KGKL (Inc.)	100W	1370	Do.

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[33] C. P. to increase power to 1 KW.

[34] Licensed at present for 10 KW only.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operaton
		TEXAS—Continued			
KMAC	San Antonio	W. W. McAllister	100W	1370	Shares with KONO.
KONO	do	Mission Broadcasting Co	100W	1370	Shares with KMAC.
KTAP	do	Alamo Broadcasting Co. (Inc.)	100W	1420	Unlimited.
KTSA	do	Lone Star Broadcast Co. (Inc.)	1KW 2KW-LS	1290	Shares with KFUL.
WOAI	San Antonio. T—Selma	Southern Equipment Co	50KW-LP	1190	Unlimited.
WACO	Waco	Central Texas Broadcasting Co. (Inc.).	1KW	1240	Shares with KTAT.
KGKO	Wichita Falls	Wichita Falls Broadcasting Co	250W 500W-LS	570	Unlimited.
		UTAH			
KLO	Ogden	Peery Building Co	500W	1400	Unlimited.
KDYL	Salt Lake City	Intermountain Broadcasting Corporation.	1KW	1290	Do.
KSL	do	Radio Service Corporation of Utah	5KW	1130	Do.
		VERMONT			
WCAX	Burlington	University of Vermont	100W	1200	Shares with WNBX.
WSYB	Rutland	H. E. Seward, jr., and Philip Weiss, doing business as Seward and Weiss Music Co.	100W	1500	Unlimited.
WNBX	Springfield	First Congregational Church Corporation.	10W	1200	Shares with WCAX.
WQDM	St. Albans	A. J. St. Antoine	5W [35]	1370	Daytime.

VIRGINIA

WJSV	Alexandria. T—Mount Vernon Hills.	Independent Publishing Co.	10KW	1460	Unlimited.
WBTM	Danville	L. H., R. G., and A. S. Clarke, doing business as Clarke Electric Co.	100W	1370	Shares with WLVA.
WEHC	Emory	Emory and Henry College	100W 250W–LS.	1200	Unlimited.
WLVA	Lynchburg	Lynchburg Broadcasting Corporation.	100W	1370	Shares with WBTM.
WGH	Newport News	Hampton Roads Broadcasting Corporation.	100W	1310	Unlimited.
WTAR–WPOR	Norfolk	WTAR Radio Corporation	500W	780	Do.
WLBG	Petersburg. T—Ettrick	Robert Allen Gamble	100W 250W–LS	1200	Do.
WBBL	Richmond	Grace Covenant Presbyterian Church.	100W	1210	Certain hours, Sunday only.
WMBG	do	Havens and Martin (Inc.)	100W	1210	Unlimited, except Sunday, shares with WBBL.
WRVA	Richmond. T—Mechanicsville.	Larus and Brother Co. (Inc.)	5KW	1110	Unlimited.
WDBJ	Roanoke	Richardson-Wayland Electrical Corporation.	250W 500W–LS	930	Do.
WRBX	do	Richmond Development Corporation.	250W	1410	One-half time.

WASHINGTON

KXRO	Aberdeen	KXRO (Inc.)	75W [36]	1310	Unlimited.
KVOS	Bellingham	KVOS (Inc.)	100W	1200	Do.
KFBL	Everett	Otto Leese and Robert Leese, doing business as Leese Bros.	50W	1370	Shares with KVI.
KGY	Lacey	St. Martins College	10W	1200	Unlimited.
KWSC	Pullman	State College of Washington	1KW 2KW–LS	1220	Do.
KFQW	Seattle	KFQW (Inc.)	100W	1420	Do.

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[36] C. P. to increase power to 100 watts

[36] C. P. to increase power to 100 watts.

BROADCASTING STATIONS, ALPHABETICALLY BY STATES AND CITIES—Continued

Call letters	Main studio location	Licensee	Power	Kilocycles	Time of operation
		WASHINGTON—Continued			
KJR	Seattle	Northwest Broadcasting System (Inc.).	5KW	970	Unlimited.
KOL	do	Seattle Broadcasting Co. (Inc.)	1KW	1270	Shares with KTW.
KOMO	do	Fisher's Blend Station (Inc.)	1KW	920	Unlimited.
KPCB	do	Queen City Broadcasting Co	100W	650	Limited.
KRSC	do	Radio Sales Corporation	50W	1120	Daytime.
KTW	do	First Presbyterian Church	1KW	1270	Shares with KOL.
KVL	do	KVL (Inc.)	100W	1370	Shares with KFBL.
KXA	do	American Radio Telephone Co	500W	570	Unlimited.
KFIO	Spokane	Spokane Broadcasting Corporation	100W	1120	Daytime.
KFPY	do	Symons Broadcasting Co	1KW	1340	Unlimited.
KGA	do	Northwest Broadcasting System (Inc.).	5KW	1470	Do.
KHQ	do	Louis Wasmer (Inc.)	1KW 2KW-LS	590	Do.
KMO	Tacoma	KMO (Inc.)	500W	860	Limited.
KVI	Tacoma. T—Des Moines	Puget Sound Broadcasting Co. (Inc.).	1KW	760	Do.
KUJ	Walla Walla	Paul R. Heitmeyer	100W	1370	One-half time (C. P. only).
KPQ	Wenatchee	Wescoast Broadcasting Co	50W	1500	Unlimited.
KIT	Yakima	Carl E. Haymond	50W	1310	Do.
		WEST VIRGINIA			
WHIS	Bluefield	Daily Telegraph Printing Co	100W [37]	1420	Unlimited.
WOBU	Charleston	WOBU (Inc.)	250W	580	Shares with WSAZ.
WMMN	Fairmont	Holt-Rowe Novelty Co	250W 500W-LS	890	Unlimited.
WSAZ	Huntington	WSAZ (Inc.)	250W	580	Shares with WOBU.
WWVA	Wheeling	West Virginia Broadcasting Corporation.	5KW	1160	Shares with WOWO.

WISCONSIN

WTAQ	Eau Claire. T—Township of Washington.	Gillette Rubber Co	1KW	1330	Shares with KSCJ.
KFIZ	Fond du Lac	The Reporter Printing Co	100W	1420	Unlimited.
WHBY	Green Bay. T—West De Pere.	St. Norbert College	100W	1200	Do.
WCLO	Janesville	WCLO Radio Corporation	100W	1200	Do.
WKBH	La Crosse	WKBH (Inc.)	1KW	1380	Shares with KSO.
WHA	Madison	University of Wisconsin	750W	940	Daytime.
WIBA	do	The Capital Times Co	500W	1280	Unlimited.
WOMT	Manitowoc	Francis M. Kadow	100W	1210	Do.
WHAD	Milwaukee	Marquette University	250W	1120	Shares with WISN.
WISN	do	Evening Wisconsin Co	250W	1120	Shares with WHAD.
WTMJ	Milwaukee. T—Brookfield	The Journal Co. (Milwaukee Journal).	1KW 2½KW-LS	620	Unlimited.
WIBU	Poynette	Wm. C. Forrest	100W	1210	Do.
WRJN	Racine	Racine Broadcasting Corporation	100W	1370	Do.
WHBL	Sheboygan	Press Publishing Co	500W	1410	Shares with KFLV.
WISJ	South Madison	The Wisconsin State Journal Broadcasting Co.	250W 500W-LS	780[38]	Unlimited.
WLBL	Stevens Point	State of Wisconsin, Department of Agriculture and Markets.	2KW	900	Daytime.
WEBC	Superior	Head of the Lakes Broadcasting Co	1KW 2½KW-LS	1290	Unlimited.

WYOMING

KDFN	Casper	Donald Lewis Hathaway	100W	1210	Do.

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[37] C. P. to increase power to 250 watts, to change frequency to 1410 kilocycles, and to operate one-half time.

[38] Experimentally.

BROADCASTING STATIONS BY FREQUENCIES

550 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WGR	Buffalo, N. Y. T—Amherst, N. Y.	Buffalo Broadcasting Corporation	1KW	Unlimited.
WKRC	Cincinnati, Ohio	WKRC (Inc.)	1KW	Do.
KFUO	Clayton, Mo	Evangelical Lutheran Synod of Missouri, Ohio, and other States, Rev. R. Kretzschmar, chairman Board of Control of Concordia Seminary.	500W 1KW–LS	Shares with KSD.
KSD	St. Louis, Mo	Pulitzer Publishing Co	500W	Shares with KFUO.
KFDY	Brookings, S. Dak	South Dakota State College	500 W 1KW–LS	Shares with KFYR.
KFYR	Bismarck, N. Dak	Meyer Broadcasting Co	1KW 2½KW–LS[1]	Shares with KFDY.
KOAC	Corvallis, Oreg	Oregon State Agricultural College	1KW	Unlimited.

560 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WLIT	Philadelphia, Pa	Lit Bros	500W	Shares with WFI.
WFI	do	Strawbridge & Clothier	500W	Shares with WLIT.
WQAM	Miami, Fla	Miami Broadcasting Co	1KW	Unlimited.
KFDM	Beaumont, Tex	Magnolia Petroleum Co	500W 1KW–LS	Do.
WNOX	Knoxville, Tenn	Sterchi Bros	1KW 2KW–LS	Do.
WIBO	Chicago, Ill. T—Des Plaines, Ill.	Nelson Bros. Bond & Mortgage Co	1KW 1½KW–LS	Shares with WPCC and WISJ.[2]
WPCC	Chicago, Ill	North Shore Church	500W	Shares with WIBO and WISJ.[2]
KLZ	Denver, Colo	Reynolds Radio Co. (Inc.)	1KW	Unlimited.
KTAB	San Francisco, Calif. T—Oakland, Calif.	The Associated Broadcasters (Inc.)	1KW	Do.

570 KILOCYCLES

WNYC	New York, N. Y	City of New York, Department of Plant and Structures.	500W	Shares with WMCA.
WMCA	New York, N. Y. T—Hoboken, N. J.	Knickerbocker Broadcasting Co. (Inc.)	500W	Shares with WNYC.
WSYR-WMAC	Syracuse, N. Y	Clive B. Meredith	250W	Unlimited.
WKBN	Youngstown, Ohio	W. P. Williamson, jr	500W	Shares with WEAO.
WEAO	Columbus, Ohio	Ohio State University	750W	Shares with WKBN.
WWNC	Asheville, N. C	Citizen Broadcasting Co. (Inc.)	1KW	Unlimited.
KGKO	Wichita Falls, Tex	Wichita Falls Broadcasting Co	250W 500W-LS	Do.
WNAX	Yankton, S. Dak	The House of Gurney (Inc.)	1KW	Do.
KXA	Seattle, Wash	American Radio Telephone Co	500W	Do.
KMTR	Los Angeles, Calif	KMTR Radio Corporation	500W	Do.

580 KILOCYCLES (Canadian Shared)

WTAG	Worcester, Mass	Worcester Telegram Publishing Co. (Inc.)	250W	Unlimited.
WOBU	Charleston, W. Va	WOBU (Inc.)	250W	Shares with WSAZ.
WSAZ	Huntington, W. Va	WSAZ (Inc.)	250W	Shares with WOBU.
KGFX	Pierre, S. Dak	Dana McNeil	200W	Daytime.
WIBW	Topeka, Kans	Topeka Broadcasting Association (Inc.)	1KW[3]	Shares with KSAC.
KSAC	Manhattan, Kans	Kansas State Agricultural College	500W 1KW-LS	Shares with WIBW.

590 KILOCYCLES

WEEI	Boston, Mass. T—Weymouth, Mass.	Edison Electric Illuminating Co. of Boston.	1KW	Unlimited.
WKZO	Berrien Springs, Mich	WKZO (Inc.)	1KW	Daytime.
WCAJ	Lincoln, Nebr	Nebraska Wesleyan University	500W[4]	Shares with WOW.

[1] Experimentally.

[2] WISJ temporarily operating on 780 kilocycles.

[3] Experimentally.

[4] C. P. to decrease power to 250 watts.

BROADCASTING STATIONS BY FREQUENCIES—Continued

590 KILOCYCLES—Continued

Call letters	Main studio location	Licensee	Power	Time of operation
WOW	Omaha, Nebr	Woodman of the World Life Insurance Association.	1KW	Shares with WCAJ.
KHQ	Spokane, Wash	Louis Wasmer (Inc.)	1KW 2KW–LS	Unlimited.

600 KILOCYCLES (Canadian Shared)

Call letters	Main studio location	Licensee	Power	Time of operation
WCAC	Storrs, Conn	Connecticut Agricultural College	250W	Shares with WGBS.
WCAO	Baltimore, Md	Monumental Radio (Inc.)	250W	Unlimited.
WGBS	New York, N. Y. T—Astoria, L. I., N. Y.	General Broadcasting System (Inc.)	250W 500W–LS[5]	Shares with WCAC.
WREC–WOAN	Memphis, Tenn. T—Whitehaven, Tenn.	WREC (Inc.)	500W 1KW–LS	Unlimited.
WMT	Waterloo, Iowa	Waterloo Broadcasting Co	500W	Do.
KFSD	San Diego, Calif	Airfan Radio Corporation (Ltd.)	500W 1KW–LS	Do.

610 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WJAY	Cleveland, Ohio	Cleveland Radio Broadcasting Corporation.	500W	Daytime.
WFAN	Philadelphia, Pa	Keystone Broadcasting Co	500W	Shares with WIP.
WIP	do	Gimble Brothers (Inc.)	500W	Shares with WFAN.
WDAF	Kansas City, Mo	Kansas City Star Co	1KW	Unlimited.
KFRC	San Francisco, Calif	Don Lee (Inc.)	1KW	Do.

620 KILOCYCLES

WLBZ	Bangor, Me	Maine Broadcasting Co. (Inc.)	500W	Unlimited.
WFLA-WSUN	Clearwater, Fla	Clearwater Chamber of Commerce and St. Petersburg Chamber of Commerce.	1KW 2½KW-LS	Do.
WTMJ	Milwaukee, Wis. T—Brookfield, Wis.	The Journal Co. (Milwaukee Journal)	1KW 2½KW-LS	Do.
KGW	Portland, Oreg	Oregonian Publishing Co	1KW	Do.
KTAR	Phoenix, Ariz	KTAR Broadcasting Co	500W 1KW-LS	Do.

630 KILOCYCLES (Canadian Shared)

WMAL	Washington, D. C	M. A. Leese	250W 500W-LS	Unlimited.
WOS	Jefferson City, Mo	Missouri State Marketing Bureau	500W	Shares with WGBF and KFRU.
KFRU	Columbia, Mo	Stephens College	500W	Shares with WOS and WGBF.
WGBF	Evansville, Ind	Evansville on the Air (Inc.)	500W	Shares with WOS and KFRU.

640 KILOCYCLES

WAIU	Columbus, Ohio	American Insurance Union	500W	Limited.
WOI	Ames, Iowa	Iowa State College of Agriculture and Mechanic Arts.	5KW	Daytime.
KFI	Los Angeles, Calif.[6]	Earle C. Anthony (Inc.)	5KW	Unlimited.

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[5] Experimentally.

[6] C. P. to move transmitter to Buena Park and increase power to 50KW-LP.

BROADCASTING STATIONS BY FREQUENCIES—Continued

Call letters	Main studio location	Licensee	Power	Time of operation
650 KILOCYCLES				
WSM	Nashville, Tenn	National Life & Accident Insurance Co	5KW	Unlimited.
KPCB	Seattle, Wash	Queen City Broadcasting Co	100W	Limited.
660 KILOCYCLES				
WEAF	New York, N. Y. T—Bellmore, N. Y.	National Broadcasting Co. (Inc.)	50KW–LP	Unlimited.
WAAW	Omaha, Nebr	Omaha Grain Exchange	500W	Daytime.
670 KILOCYCLES				
WMAQ	Chicago, Ill. T—Addison, Ill.	WMAQ (Inc.)	5KW	Unlimited.
680 KILOCYCLES				
WPTF	Raleigh, N. C	Durham Life Insurance Co	1KW	Limited.
KFEQ	St. Joseph, Mo	Scroggin & Co. Bank	2½KW	Daytime.
KPO	San Francisco, Calif	Hale Bros. Stores (Inc.), and the Chronicle Publishing Co.	5KW	Unlimited.

690 KILOCYCLES (Canadian Exclusive)

700 KILOCYCLES

WLW	Cincinnati, Ohio. T—Mason, Ohio.	Crosley Radio Corporation	50KW–LP	Unlimited.

710 KILOCYCLES

WOR	Newark, N. J. T—Kearny, N. J.	Bamberger Broadcasting Service (Inc.)	5KW	Unlimited.
KMPC	Beverly Hills, Calif	R. S. MacMillan	500W	Limited.

720 KILOCYCLES

WGN–WLIB	Chicago, Ill. T—Elgin, Ill.	The Tribune Co	25KW	Unlimited.

730 KILOCYCLES (Canadian Exclusive)

740 KILOCYCLES

WSB	Atlanta, Ga	Atlanta Journal Co	5KW	Unlimited.
KMMJ	Clay Center, Nebr	The M. M. Johnson Co	1KW	Limited.

750 KILOCYCLES

WJR	Detroit, Mich. T—Sylvan Lake Village, Mich.	WJR, The Goodwill Station (Inc.)	5KW	Unlimited.

BROADCASTING STATIONS BY FREQUENCIES—Continued

760 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WJZ	New York, N. Y. T—Boundbrook, N. J.	National Broadcasting Co. (Inc.)	30KW–LP	Unlimited.
WEW	St. Louis, Mo	St. Louis University	1KW	Daytime.
KVI	Tacoma, Wash. T—Des Moines, Wash.	Puget Sound Broadcasting Co. (Inc.)	1KW	Limited.

770 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
KFAB	Lincoln, Nebr	KFAB Broadcasting Co	5KW	Shares with WBBM–WJBT.
WBBM–WJBT	Chicago, Ill. T—Glenview, Ill.	The Atlass Co. (Inc.)	25KW	Shares with KFAB.

780 KILOCYCLES (Canadian Shared)

Call letters	Main studio location	Licensee	Power	Time of operation
WEAN	Providence, R. I	Shepard Broadcasting Service (Inc.)	250W 500W–LS	Unlimited.
WTAR–WPOR	Norfolk, Va	WTAR Radio Corporation	500W	Do.
WMC	Memphis, Tenn. T—Bartlett, Tenn.	Paul Dillard and Enoch Brown, jr., receivers.	500W 1KW–LS	Do.
WISJ	South Madison, Wis	The Wisconsin State Journal Co. [7]	250W 500W–LS	Do.
KELW	Burbank, Calif	Union Bank and Trust Co. of Los Angeles, guardian of estate of Earl L. White.	500W	Shares with KTM.
KTM	Los Angeles, Calif. T—Santa Monica, Calif.	Pickwick Broadcasting Corporation	500W 1KW–LS	Shares with KELW.

790 KILOCYCLES

WGY	Schenectady, N. Y. T—South Schenectady, N. Y.	General Electric Co	50KW	Unlimited.
KGO	San Francisco, Calif. T—Oakland, Calif.	National Broadcasting Co. (Inc.)	7½KW	Do.

800 KILOCYCLES

WBAP	Fort Worth, Tex	Carter Publications (Inc.)	50KW–LP[8]	Shares with WFAA.
WFAA	Dallas, Tex. T—Grapevine, Tex.	Dallas News and Dallas Journal A. H. Belo Corporation.	50KW–LP	Shares with WBAP.

810 KILOCYCLES

WPCH	New York, N. Y. T—Hoboken, N. J.	Eastern Broadcasters (Inc.)	500W	Daytime.
WCCO	Minneapolis, Minn. T—Anoka, Minn.	Northwestern Broadcasting (Inc.)	7½KW	Unlimited.

820 KILOCYCLES

WHAS	Louisville, Ky. T—Jeffersontown, Ky.	The Courier Journal Co. and The Louisville Times Co.	10KW	Unlimited.

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[8] Licensed at present for 10 KW only.

[7] Experimentally on 780 kilocycles.

BROADCASTING STATIONS BY FREQUENCIES—Continued

830 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WHDH	Boston, Mass. T—Gloucester, Mass.	Matheson Radio Co. (Inc.)	1KW	Daytime until sunset at Denver, Colo.
WRUF	Gainesville, Fla	University of Florida	5KW	Limited.
KOA	Denver, Colo	National Broadcasting Co. (Inc.)	12½KW	Unlimited.

840 KILOCYCLES (Canadian Exclusive)

850 KILOCYCLES

KWKH	Shreveport, La. T—Kennonwood, La.	Hello World Broadcasting Corporation	10KW	Shares with WWL.
WWL	New Orleans, La	Loyola University	5KW	Shares with KWKH.

860 KILOCYCLES

WABC-WBOQ	New York, N. Y. T—West of Cross Bay Blvd. Queens Co., N. Y.[9]	Atlantic Broadcasting Corporation	5KW	Unlimited.
WHB	Kansas City, Mo. T—North Kansas City, Mo.	WHB Broadcasting Co	500W	Daytime.
KMO	Tacoma, Wash	KMO (Inc.)	500W	Limited.

870 KILOCYCLES

WLS	Chicago, Ill. T—Crete, Ill.	Agricultural Broadcasting Co	5KW[10]	Shares with WENR-WBCN.
WENR-WBCN[9]	Chicago, Ill. T—Downers Grove, Ill.	Great Lakes Broadcasting Co	50 KW-LP	Shares with WLS.

880 KILOCYCLES (Canadian Shared)

WGBI	Scranton, Pa	Scranton Broadcasters (Inc.)	250W	Shares with WQAN.
WQAN	do	E. J. Lynett, prop. the Scranton Times	250W	Shares with WGBI.
WCOC	Meridian, Miss	Mississippi Broadcasting Co. (Inc.)	500W 1 KW-LS	Unlimited.
WSUI	Iowa City, Iowa	State University of Iowa	500W	Three-sevenths time.
KLX	Oakland, Calif	The Tribune Publishing Co	500W	Unlimited.
KPOF	Denver, Colo	Pillar of Fire	500W	Shares with KFKA.
KFKA	Greeley, Colo	The Mid-Western Radio Corporation	500W 1 KW-LS	Shares with KPOF.

890 KILOCYCLES (Canadian Shared)

WJAR	Providence, R. I	The Outlet Co	250W 400W-LS	Unlimited.
WKAQ	San Juan, P. R	Radio Corporation of Porto Rico	500W	Do.
WMMN	Fairmont, W. Va	Holt-Rowe Novelty Co	250W 500W-LS	Do.
WMAZ	Macon, Ga	Macon Junior Chamber of Commerce	250W 500W-LS	Shares with WGST.
WGST	Atlanta, Ga	Georgia School of Technology	250W 500W-LS	Shares with WMAZ.
KGJF	Little Rock, Ark	First Church of the Nazarene	250W	Unlimited.

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[9] C. P. to move transmitter to Wayne, N. J., and increase power to 50 KW-LP.

[10] C. P. to increase power to 50 KW-LP.

BROADCASTING STATIONS BY FREQUENCIES—Continued

890 KILOCYCLES (Canadian Shared)—Continued

Call letters	Main studio location	Licensee	Power	Time of operation
WILL	Urbana, Ill	University of Illinois	250W 500W–LS	Shares with KUSD and KFNF.
KUSD	Vermillion, S. Dak	University of South Dakota	500W 750W–LS	Shares with WILL and KFNF.
KFNF	Shenandoah, Iowa	Henry Field Co	500W 1KW–LS	Shares with WILL and KUSD.

900 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WBEN	Buffalo, N. Y. T—Martinsville, N. Y.	Edward H. Butler, trustee for Ada Butler Mitchell and Edward H. Butler, trading as Buffalo Evening News.	1KW	Unlimited.
WKY	Oklahoma City, Okla	WKY Radiophone Co	1KW	Do.
WJAX	Jacksonville, Fla	City of Jacksonville	1KW	Do.
WLBL	Stevens Point, Wis	State of Wisconsin, Department of Agriculture and Markets.	2KW	Daytime.
KHJ	Los Angeles, Calif	Don Lee (Inc.)	1KW	Unlimited.
KSEI	Pocatello, Idaho	KSEI Broadcasting Association (Inc.)	250W	Do.
KGBU	Ketchikan, Alaska	Alaska Radio and Service Co. (Inc.)	500W	Do.

910 KILOCYCLES (Canadian Exclusive)

920 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WBSO	Needham, Mass	Babson's Statistical Organization (Inc.)	500W	Daytime.
WWJ	Detroit, Mich	The Evening News Association (Inc.)	1KW	Unlimited.
KPRC	Houston, Tex. T—Sugarland, Tex.	Houston Printing Co.	1KW 2½KW–LS	Do.
WAAF	Chicago, Ill	Drovers Journal Publishing Co.	500W	Daytime.

KOMO	Seattle, Wash	Fisher's Blend Station (Inc.)	1KW	Unlimited.
KFEL	Denver, Colo.[11]	Eugene P. O'Fallon (Inc.)	500W	Shares with KFXF.
KFXF	Denver, Colo	Colorado Radio Corporation	500W	Shares with KFEL.

930 KILOCYCLES (Canadian Shared)

WIBG	Elkins Park, Pa	St. Paul's P. E. Church	50W	Daytime.
WDBJ	Roanoke, Va	Richardson-Wayland Electrical Corporation.	250W 500W-LS	Unlimited.
WBRC	Birmingham, Ala	Birmingham Broadcasting Co. (Inc.)	500W 1KW-LS	Do.
KGBZ	York, Nebr	Dr. George R. Miller	500W 1KW-LS	Shares with KMA.
KMA	Shenandoah, Iowa	May Seed and Nursery Co	500W 1KW-LS	Shares with KGBZ.
KFWI	San Francisco, Calif	Radio Entertainments (Inc.)	500W	Shares with KROW.
KROW	Oakland, Calif. T—Richmond, Calif.	Educational Broadcasting Corporation	500W 1KW-LS	Shares with KFWI.

940 KILOCYCLES

WAAT	Jersey City, N. J	Bremer Broadcasting Corporation	300W	Daytime until 6 p. m. eastern standard time.
WCSH	Portland, Me. T—Scarboro, Me.	Congress Square Hotel Co	1KW	Unlimited.
WFIW	Hopkinsville, Ky	WFIW (Inc.)	1KW	Do.
WHA	Madison, Wis	University of Wisconsin	750W	Daytime.
WDAY	Fargo, N. Dak. T—West Fargo, N. Dak.	WDAY (Inc.)	1KW	Unlimited.
KOIN	Portland, Oreg. T—Sylvan, Oreg.	KOIN (Inc.)	1KW	Do.
KGU	Honolulu, Hawaii	Marion A. Mulrony and Advertiser Publishing Co. (Ltd.).	1KW	Do.

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[11] C. P. to move transmitter to Edgewater, Colo.

BROADCASTING STATIONS BY FREQUENCIES—Continued

950 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WRC	Washington, D. C	National Broadcasting Co. (Inc.)	500W	Unlimited.
KMBC	Kansas City, Mo. T—Independence, Mo.	Midland Broadcasting Co	1KW	Do.
KFWB	Hollywood, Calif	Warner Bros. Broadcasting Corporation	1KW	Do.
KGHL	Billings, Mont	Northwestern Auto Supply Co. (Inc.)	1KW	Do.

960 KILOCYCLES (Canadian Exclusive)

970 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WCFL	Chicago, Ill	Chicago Federation of Labor	1½ KW	Limited.
KJR	Seattle, Wash	Northwest Broadcasting System (Inc.)	5KW	Unlimited.

980 KILOCYLCES

Call letters	Main studio location	Licensee	Power	Time of operation
KDKA	Pittsburgh, Pa. T—Saxonburg, Pa.	Westinghouse Electric & Manufacturing Co.	50KW-LP	Unlimited.

990 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WBZ	Springfield, Mass. T—East Springfield, Mass.[12]	Westinghouse Electric & Manufacturing Co.	15KW	Shares with WBZA.
WBZA	Boston, Mass. [13]	do	500W	Shares with WBZ.

1000 KILOCYCLES

WHO	Des Moines, Iowa	Central Broadcasting Co	5KW	Synchronizes with WOC experimentally.
WOC	Davenport, Iowa	do	5KW	Synchronizes with WHO experimentally.
KFVD	Culver City, Calif	Los Angeles Broadcasting Co	250W	Limited.

1010 KILOCYCLES (Canadian Shared)

WQAO-WPAP	New York, N. Y. T—Cliffside, N. J.	Calvary Baptist Church	250W	Shares with WHN and WRNY.
WHN	New York, N. Y	Marcus Loew Booking Agency	250W	Shares with WQAO-WPAP and WRNY.
WRNY	New York, N. Y. T—Coytesville, N. J.	Aviation Radio Station (Inc.)	250W	Shares with WQAO-WPAP and WHN.
KGGF	South Coffeyville, Okla	Hugh J. Powell and Stanley Platz, doing business as Powell & Platz.	500W	Shares with WNAD.
WNAD	Norman, Okla	University of Oklahoma	500W	Shares with KGGF.
WIS	Columbia, S. C	South Carolina Broadcasting Co. (Inc.)	500W 1KW-LS	Unlimited.
KQW	San Jose, Calif	Pacific Agricultural Foundation (Ltd.)	500W	Do.

1020 KILOCYCLES

WRAX	Philadelphia, Pa	WRAX Broadcasting Co	250W	Daytime.
KYW-KFKX	Chicago, Ill. T—Bloomingdale Township, Ill.	Westinghouse Electric & Manufacturing Co.	10KW	Unlimited.

1030 KILOCYCLES (Canadian Exclusive)

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[12] C. P. to move transmitter to Millis Township, Mass. and studio to Boston, Mass. and consolidate with WBZA.

[13] C. P. to move transmitter to East Springfield and increase powert to 1KW.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1040 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WMAK	Buffalo, N. Y. T—Grand Island, N. Y.[14]	Buffalo Broadcasting Corporation	1KW	Limited.
WKAR	East Lansing, Mich	Michigan State College	1KW	Daytime.
KTHS	Hot Springs National Park, Ark.	Hot Springs Chamber of Commerce	10KW	Shares with KRLD.
KRLD	Dallas, Tex	KRLD Radio Corporation	10KW	Shares with KTHS.

1050 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
KFKB	Milford, Kans	The KFKB Broadcasting Association (Inc.).	5KW	Limited.
KNX	Hollywood, Calif. T—Los Angeles, Calif.	Western Broadcast Co	5KW[15]	Unlimited.

1060 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WBAL	Baltimore, Md. T—Glen Morris, Md.	Consolidated Gas Electric Light & Power Company of Baltimore.	10KW	Shares with WTIC.
WTIC	Hartford, Conn. T—Avon, Conn.	Travelers Broadcasting Service Corporation.	50KW–LP	Shares with WBAL.
WJAG	Norfolk, Nebr	Norfolk Daily News	1KW	Limited.
KWJJ	Portland, Oreg	KWJJ Broadcast Co. (Inc.)	500W	Do.

1070 KILOCYCLES

WTAM	Cleveland, Ohio, T—Brecksville Village, Ohio.	National Broadcasting Co. (Inc.)	50KW–LP	Unlimited.
WCAZ	Carthage, Ill	Superior Broadcasting Service (Inc.)	50W	Daytime.
WDZ	Tuscola, Ill	James L. Bush	100W	Do.
KJBS	San Francisco, Calif	Julius Brunton & Sons Co	100W	12. 01 a. m. to local sunset.

1080 KILOCYCLES

WBT	Charlotte, N. C	Station WBT (Inc.)	5KW	Unlimited.
WCBD	Zion, Ill	Wilbur Glenn Voliva	5KW	Limited. Shares with WMBI.
WMBI	Chicago, Ill. T—Addison, Ill.	The Moody Bible Institute Radio Station	5KW	Limited. Shares with WCBD.

1090 KILOCYCLES

KMOX	St. Louis, Mo	Voice of St. Louis (Inc.)	50KW–LP	Unlimited.

1100 KILOCYCLES

WPG	Atlantic City, N. J	WPG Broadcasting Corporation	5KW	Shares with WLWL.
WLWL	New York, N. Y. T—Kearny, N. J.	Missionary Society of St. Paul the Apostle	5KW	Shares with WPG.
KGDM	Stockton, Calif	E. F. Peffer	250W	Daytime.

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[14] C. P. to move transmitter to Amherst, N. Y.

[15] C. P. to increase power to 50 KW–LP.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1110 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WRVA	Richmond, Va. T—Mechanicsville, Va.	Larus & Brother Co. (Inc.)	5KW	Unlimited.
KSOO	Sioux Falls, S. Dak	Sioux Falls Broadcast Association (Inc.)	2KW	Limited.

1120 KILOCYCLES (Canadian Shared)

Call letters	Main studio location	Licensee	Power	Time of operation
WDEL	Wilmington, Del.	WDEL (Inc.)	250W 350W–LS[16]	Unlimited.
WDBO	Orlando, Fla	Orlando Broadcasting Co. (Inc.)	500W 1KW–LS	One-half time.
WTAW	College Station, Tex	Agricultural and Mechanical College of Texas.	500W	Shares with KTRH.
KTRH	Houston, Tex	Rice Hotel	500W	Shares with WTAW.
WISN	Milwaukee, Wis	Evening Wisconsin Co	250W	Shares with WHAD.
WHAD	do	Marquette University	250W	Shares with WISN.
KFSG	Los Angeles, Calif	Echo Park Evangelistic Association	500W	Shares with KMCS.
KMCS	Inglewood, Calif	Dalton's (Inc.)	500W	Shares with KFSG.
KRSC	Seattle, Wash	Radio Sales Corporation	50W	Daytime.
KFIO	Spokane, Wash	Spokane Broadcasting Corporation	100W	Do.

1130 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WOV	New York City. T—Secaucus, N. J.	International Broadcasting Corporation	1KW	Daytime until 6 p. m.
WJJD	Mooseheart, Ill	Supreme Lodge of the World, Loyal Order of Moose.	20KW	Limited.
KSL	Salt Lake City, Utah	Radio Service Corporation of Utah	5KW	Unlimited.

1140 KILOCYCLES

WAPI	Birmingham, Ala	Alabama Polytechnic Institute, University of Alabama and Alabama College.	5KW	Shares with KVOO.
KVOO	Tulsa, Okla	Southwestern Sales Corporation	5KW	Shares with WAPI.

1150 KILOCYCLES

WHAM	Rochester, N. Y. T—Victor Township, N. Y.	Stromberg-Carlson Telephone Manufacturing Co.	5KW	Unlimited.

1160 KILOCYCLES

WWVA	Wheeling, W. Va	West Virginia Broadcasting Corporation	5KW	Shares with WOWO.
WOWO	Fort Wayne, Ind	Main Auto Supply Co	10KW	Shares with WWVA.

1170 KILOCYCLES

WCAU	Philadelphia, Pa. T—Byberry, Pa.	Universal Broadcasting Co	10KW	Unlimited.
KTNT	Muscatine, Iowa	Norman Baker	5KW	Limited.

1180 KILOCYCLES

WDGY	Minneapolis, Minn	Dr. George W. Young	1KW	Limited. Shares with WHDI.
WHDI	do	William Hood Dunwoody Industrial Institute.	500W	Limited. Shares with WDGY.
KEX	Portland, Oreg	Western Broadcasting Co	5KW	Shares with KOB.
KOB	State College, N. Mex	New Mexico College of Agriculture and Mechanic Arts.	20KW	Shares with KEX.

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[16] C. P. to increase power to 500 Watts-LS.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1190 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WICC	Bridgeport, Conn. T—Easton, Conn.	Bridgeport Broadcasting Station (Inc.)	500W	Daytime.
WOAI	San Antonio, Tex. T—Selma, Tex.	Southern Equipment Co	50KW–LP	Unlimited.

1200 KILOCYCLES (Canadian Shared)

Call letters	Main studio location	Licensee	Power	Time of operation
WABI	Bangor, Me	Pine Tree Broadcasting Corporation	100W	Unlimited.
WNBX	Springfield, Vt	First Congregational Church Corporation.	10W	Shares with WCAX.
WCAX	Burlington, Vt	University of Vermont	100W	Shares with WNBX.
WORC–WEPS	Worcester, Mass. T—Auburn, Mass.	Albert Frank Kleindienst	100W	Unlimited.
WIBX	Utica, N. Y	WIBX (Inc.)	100W 300W–LS	Do.
WFBE	Cincinnati, Ohio	Radio Station WFBE (Inc.)	100W 250W–LS	Do.
WHBC	Canton, Ohio	St. John's Catholic Church	10W	Shares with WNBO Sundays.
WLAP	Louisville, Ky	American Broadcasting Corporation of Kentucky.	100W 250W–LS	Unlimited.
WEHC	Emory, Va	Emory and Henry College	100W 250W–LS	Do.
WLBG	Petersburg, Va. T—Ettrick, Va.	Robert Allen Gamble	100W 250W–LS	Do.
WNBO	Silver Haven, Pa	John Brownlee Spriggs	100W	Shares with WHBC Sundays.
WCOD	Harrisburg, Pa	Keystone Broadcasting Corporation	100W	Shares with WKJC.
WKJC	Lancaster, Pa	Kirk Johnson & Co	100W	Shares with WCOD.
WNBW	Carbondale, Pa	C. F. Schiessler and M. E. Stephens, doing business as Home Cut Glass & China Co.	10W	Unlimited.

KMLB	Monroe, La	J. C. Liner	50W	Daytime.
WABZ	New Orleans, La	Coliseum Place Baptist Church	100W	Shares with WJBW.
WJBW	do	C. Carlson	30W[17]	Shares with WABZ.
WBBZ	Ponca City, Okla	C. L. Carrell	100W	Unlimited.
WFBC	Knoxville, Tenn	First Baptist Church	50W	Do.
WRBL	Columbus, Ga	David Parmer	50W	Do.
KGHI	Little Rock, Ark	Berean Bible Class, First Baptist Church	100W	Do.
KBTM	Paragould, Ark	W. J. Beard, Beard's Temple of Music	100W	Daytime.
WJBC	La Salle, Ill	Wayne Hummer & H. J. Dee, doing business as Kaskaskia Broadcasting Co.	100W	Shares with WJBL.
WJBL	Decatur, Ill	Commodore Broadcasting (Inc.)	100W	Shares with WJBC.
WWAE	Hammond, Ill	Hammond-Calumet Broadcasting Corporation.	100W	Shares with WRAF.
WRAF	Laporte, Ind	Charles Middleton	100W	Shares with WWAE.
KFJB	Marshalltown, Iowa	Marshall Electric Co. (Inc.)	100W 250W–LS	One-half time.
KGCU	Mandan, N. Dak	Mandan Radio Association	100W	Unlimited.
WCAT	Rapid City, S. Dak	South Dakota State School of Mines	100W	Do.
KGDY	Huron, S. Dak	Voice of South Dakota	100W	Do.
KFWF	St. Louis, Mo	St. Louis Truth Center (Inc.)	100W	Shares with WIL.
KGDE	Fergus Falls, Minn	C. L. Jaren	100W 250W–LS	Unlimited.
WCLO	Janesville, Wis	WCLO Radio Corporation	100W	Do.
WHBY	Green Bay, Wis. T—West De Pere, Wis.	St. Norbert College	100W	Do.
WIL	St. Louis, Mo	Missouri Broadcasting Corporation	100W 250W–LS	Shares with KFWF.
KGFJ	Los Angeles, Calif	Ben S. McGlashan	100W	Unlimited.
KSMR	Santa Maria, Calif	Santa Maria Radio	100W	Do.
KWG	Stockton, Calif	Portable Wireless Telephone Co. (Inc.)	100W	Do.
KGEK	Yuma, Colo	Elmer C. Beehler, trading as Beehler Electrical Equipment Co.	50W	Shares with KGEW.
KGEW	Fort Morgan, Colo	City of Fort Morgan	100W	Shares with KGEK.
KVOS	Bellingham, Wash	KVOS (Inc.)	100W	Unlimited.
KGY	Lacey, Wash	St. Martin's College	10W	Do.

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[17] C. P. to increase power to 100 watts.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1210 KILOCYCLES (Canadian Shared)

Call letters	Main studio location	Licensee	Power	Time of operation
WMRJ	Jamaica, N. Y	Peter J. Prinz	100W	Shares with WCOH, WGBB, and WJBI.
WJBI	Redbank, N. J	Monmouth Broadcasting Co	100W	Shares with WCOH, WGBB, and WMRJ.
WGBB	Freeport, N. Y	Harry H. Carman	100W	Shares with WCOH, WJBI, and WMRJ.
WCOH	Yonkers, N. Y. T—Greenville, N. Y.	Westchester Broadcasting Corporation	100W	Shares with WJBI, WGBB, and WMRJ.
WOCL	Jamestown, N. Y	A. E. Newton	25W	Unlimited.
WLCI	Ithaca, N. Y	Lutheran Association of Ithaca, N. Y	50W	Do.
WPAW	Pawtucket, R. I	Shartenberg & Robinson Co	100W	Shares with WDWF–WLSI.
WDWF–WLSI	Providence, R. I. T—Cranston, R. I.	Dutee Wilcox Flint & Lincoln Studios (Inc.).	100W	Shares with WPAW.
WSEN	Columbus, Ohio	Columbus Broadcasting Corporation	100W	Unlimited.
WJW	Mansfield, Ohio	John F. Weimer (owner Mansfield Broadcasting Association).	100W	Do.
WALR	Zanesville, Ohio	Roy W. Waller	100W	Do.
WBAX	Wilkes-Barre, Pa. T—Plains Township, Pa.	John H. Stenger, jr	100W	Shares with WJBU.
WJBU	Lewisburg, Pa	Bucknell University	100W	Shares with WBAX.
WBBL	Richmond, Va	Grace Covenant Presbyterian Church	100W	Certain hours Sunday only.
WMBG	do	Havens & Martin (Inc.)	100W	Unlimited, except Sundays shares with WBBL.
WSIX	Springfield, Tenn	Jack M. and Louis R. Draughon, doing business as 638 Tire and Vulcanizing Co.	100W	Unlimited.
WSOC	Gastonia, N. C	WSOC (Inc.)	100W	Do.
WJBY	Gadsden, Ala	Gadsden Broadcasting Co. (Inc.)	50W	Do.
WQDX	Thomasville, Ga	Stevens Luke	50W	Do.
KGMP	Elk City, Okla	Homer F. Bryant, trading as Bryant Radio & Electric Co.	100W	Do.

WRBQ	Greenville, Miss	J. Pat Scully	100W 250W-LS	Do.
WGCM	Gulfport, Miss. T—Mississippi City, Miss.	Great Southern Land Co	100W	Do.
KWEA	Shreveport, La	Hello World Broadcasting Corporation	100W	Do.
KDLR	Devils Lake, N. Dak	KDLR (Inc.)	100W	Do.
KGCR	Watertown, S. Dak	Cutler's Radio Broadcasting Service (Inc.)	100W	Do.
KFOR	Lincoln, Nebr	Howard A. Shuman	100W 250-LS	Do.
WHBU	Anderson, Ind	Citizens Bank	100W	Do.
KFVS	Cape Girardeau, Mo	Oscar C. Hirsch, trading as Hirsch Battery & Radio Co.	100W	Shares with WEBQ.
WEBQ	Harrisburg, Ill	First Trust & Savings Bank of Harrisburg, Ill.	100W	Shares with KFVS.
KGNO	Dodge City, Kans	Dodge City Broadcasting Co. (Inc.)	100W	Unlimited.
WSBC	Chicago, Ill	World Battery Co. (Inc.)	100W	Shares with WEDC and WCRW.
WCRW	do	Clinton R. White	100W	Shares with WEDC and WSBC.
WEDC	do	Emil Denemark (Inc.)	100W	Shares with WSBC and WCRW.
WCBS	Springfield, Ill	Chas. H. Messter and Harold L. Dewing	100W	Shares with WTAX.
WTAX	do	WTAX (Inc.)	100W	Shares with WCBS.
WHBF	Rock Island, Ill	Beardsley Specialty Co	100W	Unlimited.
WOMT	Manitowoc, Wis	Francis M. Kadow	100W	Do.
WIBU	Poynette, Wis	William C. Forrest	100W	Do.
KMJ	Fresno, Calif	James McClatchy Co	100W	Do.
KFXM	San Bernardino, Calif	J. C. and E. W. Lee (Lee Brothers Broadcasting Co.)	100W	Shares with KPPC.
KPPC	Pasadena, Calif	Pasadena Presbyterian Church	50W	Shares with KFXM.
KDFN	Casper, Wyo	Donald Lewis Hathaway	100W	Unlimited.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1220 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WCAD	Canton, N. Y	St. Lawrence University	500W	Daytime.
WCAE	Pittsburgh, Pa	Kaufman & Baer Co	1KW	Unlimited.
WDAE	Tampa, Fla	Tampa Publishing Co	1KW	Do.
WREN	Lawrence, Kans	Jenny Wren Co	1KW	Shares with KFKU.
KFKU	do	University of Kansas	500W	Shares with WREN.
KWSC	Pullman, Wash	State College of Washington	1KW 2KW–LS	Unlimited.

1230 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WNAC–WBIS	Boston, Mass. T—Quincy, Mass.	Shepard Broadcasting Service (Inc.)	1KW	Unlimited.
WPSC	State College, Pa	The Pennsylvania State College	500W	Daytime.
WSBT	South Bend, Ind	South Bend Tribune	500W	Shares with WFBM.
WFBM	Indianapolis, Ind	Indianapolis Power & Light Co	1KW	Shares with WSBT.
KGGM	Albuquerque, N. Mex	New Mexico Broadcasting Co	250W 500W–LS	Unlimited.
KYA	San Francisco, Calif	Pacific Broadcasting Corporation	1KW	Do.
KFQD	Anchorage, Alaska	Anchorage Radio Club	100W	Do.

1240 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WXYZ	Detroit, Mich	Kunsky-Trendle Broadcasting Corporation.	1KW	Unlimited.
KTAT	Fort Worth, Tex. T—Birdville, Tex.	S. A. T. Broadcast Co	1KW	Shares with WACO.
WACO	Waco, Tex	Central Texas Broadcasting Co. (Inc.)	1KW	Shares with KTAT.

1250 KILOCYCLES

WGCP	Newark, N. J	May Radio Broadcast Corporation	250W	Shares with WODA and WAAM.
WODA	Paterson, N. J	Richard E. O'Dea	1KW	Shares with WGCP and WAAM.
WAAM	Newark, N. J	WAAM (Inc.)	1KW 2KW LS[18]	Shares with WODA and WGCP.
WDSU	New Orleans, La. T—Gretna, La.	Joseph H. Uhalt	1KW	Unlimited.
WLB-WGMS	Minneapolis, Minn. T—St. Paul, Minn.	University of Minnesota	1KW	Shares with WRHM, KFMX, and WCAL.
WRHM	Minneapolis, Minn. T—Fridley, Minn.	Minnesota Broadcasting Corporation	1KW	Shares with WLB, KFMX, and WCAL.
KFMX	Northfield, Minn	Carlton College	1KW	Shares with WLB, WRHM, and WCAL.
WCAL	Northfield, Minn	St. Olaf College	1KW	Shares with WLB, WRHM, and KFMX.
KFOX	Long Beach, Calif	Nichols and Warriner (Inc.)	1KW	Unlimited.
KIDO	Boise, Idaho	Frank L. Hill and C. G. Phillips, doing business as Boise Broadcast Station.	1KW	Do.

1260 KILOCYCLES

WLBW	Oil City, Pa	Radio-Wire Program Corporation of America.	500W 1KW-LS	Unlimited.
KWWG	Brownsville, Tex	The Brownsville Herald Publishing Co	500W	Shares with KRGV.
WTOC	Savannah, Ga	Savannah Broadcasting Co. (Inc.)	500W	Unlimited.
KRGV	Harlingen, Tex	KRGV (Inc.)	500W	Shares with KWWG.
KOIL	Council Bluffs, Iowa	Mona Motor Oil Co	1KW	Unlimited.
KVOA	Tucson, Ariz	Robert M. Riculfi	500W	Daytime.

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[18] C. P. to increase power to 2½ KW-LS.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1270 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WEAI	Ithaca, N. Y	Cornell University	1KW	Daytime.
WFBR	Baltimore, Md	Baltimore Radio Show (Inc.)	500W	Unlimited.
WASH	Grand Rapids, Mich	WASH Broadcasting Corporation	500W	Shares with WOOD.
WOOD	Grand Rapids, Mich. T—Furnwood, Mich.	Walter B. Stiles (Inc.)	500W	Shares with WASH.
WJDX	Jackson, Miss	Lamar Life Insurance Co	1KW	Unlimited.
KWLC	Decorah, Iowa	Luther College	100W	Daytime. Shares with KGCA.
KGCA	do	Charles W. Greenley	50W	Daytime. Shares with KWLC.
KTW	Seattle, Wash	The First Presbyterian Church of Seattle, Wash.	1KW	Shares with KOL.
KOL	do	Seattle Broadcasting Co. (Inc.)	1KW	Shares with KTW.
KFUM	Colorado Springs, Colo	W. D. Corley	1KW	Unlimited.

1280 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WCAM	Camden, N. J	City of Camden	500W	Shares with WOAX and WCAP.
WCAP	Asbury Park, N. J	Radio Industries Broadcast Co	500W	Shares with WCAM and WOAX.
WOAX	Trenton, N. J	WOAX (Inc.)	500W	Shares with WCAM and WCAP.
WDOD	Chattanooga, Tenn. T—Brainerd, Tenn.	WDOD Broadcasting Corporation	1KW 2½KW–LS	Unlimited.
WRR	Dallas, Tex	City of Dallas, Tex	500W	Do.
WIBA	Madison, Wis	The Capital Times Co	500W	Do.
KFBB	Great Falls, Mont	Buttrey Broadcast (Inc.)	1KW 2½KW–LS	Do.

1290 KILOCYCLES

WNBZ	Saranac Lake, N. Y	Earl J. Smith and William Mace, doing business as Smith & Mace.	50W	Daytime.
WJAS	Pittsburgh, Pa. T—North Fayette Township, Pa.	Pittsburgh Radio Supply House	1KW 2½KW–LS	Unlimited.
KTSA	San Antonio, Tex	Lone Star Broadcasting Co. (Inc.)	1KW 2KW–LS	Shares with KFUL.
KFUL	Galveston, Tex	Will H. Ford	500W	Shares with KTSA.
KLCN	Blytheville, Ark	Charles Leo Lintzenich	50W	Daytime.
WEBC	Superior, Wis	Head of the Lakes Broadcasting Co	1KW 2½KW–LS	Unlimited.
KDYL	Salt Lake City, Utah	Intermountain Broadcasting Corporation	1KW	Do.

1300 KILOCYCLES

WBBR	Brooklyn, N. Y. T—Rossville, N. Y. (Staten Island).	Peoples Pulpit Association	1KW	Shares with WEVD, WHAZ, and WHAP.
WHAP	New York, N. Y. T—Carlstadt, N. J.	Defenders of Truth Society (Inc.)	1KW	Shares with WEVD, WHAZ, and WBBR.
WEVD	New York, N. Y. T—Forest Hills, N. Y.	Debs Memorial Radio Fund (Inc.)	500W	Shares With WHAP, WHAZ, and WBBR.
WHAZ	Troy, N. Y	Rensselaer Polytechnic Institute	500W	Shares with WEVD, WHAP, and WBBR.
WIOD-WMBF	Miami, Fla. T—Miami Beach, Fla.	Isle of Dreams Broadcasting Corporation	1KW	Unlimited.
KFH	Wichita, Kans.	Radio Station KFH Co	1KW	Shares with WOQ.
WOQ	Kansas City, Mo	Unity School of Christianity	1KW	Shares with KFH.
KGEF	Los Angeles, Calif	Trinity Methodist Church, South	1KW	Shares with KTBI.
KTBI	Los Angeles, Calif	Bible Institute of Los Angeles	1KW	Shares with KGEF.
KFJR	Portland, Oreg	Ashley C. Dixon, trading as Ashley C. Dixon & Son.	500W	Shares with KTBR.
KTBR	do	M. E. Brown	500W	Shares with KFJR.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1310 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WKAV	Laconia, N. H	Laconia Radio Club	100W	Unlimited.
WEBR	Buffalo, N. Y	Howell Broadcasting Co. (Inc.)	100W 200W-LS	Do.
WMBO	Auburn, N. Y	George I. Stevens, trading as Radio Service Laboratories.	100W	Do.
WNBH	New Bedford, Mass. T—Fairhaven, Mass.	Irving Vermilya, trading as New Bedford Broadcasting Co.	100W	Do.
WOL	Washington, D. C	American Broadcasting Co	100W	Do.
WGH	Newport News, Va	Hampton Roads Broadcasting Corporation.	100W	Do.
WEXL	Royal Oak, Mich	Royal Oak Broadcasting Co	50W	Do.
WFDF	Flint, Mich	Frank D. Fallain	100W	Do.
WBEO	Marquette, Mich	Charles C. MacLeod	100W	Unlimited. (C. P. only.)
WHAT	Philadelphia, Pa	Independence Broadcasting Co	100W	Shares with WTEL.
WTEL	do	Foulkrod Radio Engineering Co	50W [19]	Shares with WHAT.
WJAC	Johnstown, Pa	Johnstown Automobile Co	100W	Shares with WFBG.
WFBG	Altoona, Pa	William F. Gable Co	100W [20]	Shares with WJAC.
WRAW	Reading, Pa	Reading Broadcasting Co	50W [21]	Shares with WGAL.
WGAL	Lancaster, Pa	WGAL, Incorporated	100W	Shares with WRAW.
WSAJ	Grove City, Pa	Grove City College	100W	Unlimited.
WBRE	Wilkes-Barre, Pa	Louis G. Baltimore	100W	Do.
WKBC	Birmingham, Ala	R. B. Broyles, trading as R. B. Broyles Furniture Co.	100W	Unlimited.
WRBI	Tifton, Ga	Charles A. and Milton U. Kent, doing business as Kent's Furniture & Music Store.	20W [22]	One-half time.
WOBT	Union City, Tenn	A. F. Tittsworth, trading as Tittsworth's Radio & Music Shop.	100W 250W-LS	Unlimited.
WROL	Knoxville, Tenn	Stuart Broadcasting Corporation	100W	Do.
KRMD	Shreveport, La	Robert M. Dean	50W	Shares with KTSL.
KTSL	do	G. A. Houseman	100W	Shares with KRMD.
WSJS	Winston-Salem, N. C	Winston-Salem Journal Co	100W	Unlimited.

KTLC	Houston, Tex	Houston Broadcasting Co	100W	Do.
KFPM	Greenville, Tex	Dave Ablowich, trading as The New Furniture Co.	15W	Do.
KTSM	El Paso, Tex	W. S. Bledsoe and W. T. Blackwell	100W	Shares with WDAH.
WDAH	do	E. E., C. T., E. M., and Ernest Wilson, doing business as Eagle Broadcasting Co.	100W	Shares with KTSM.
KFPL	Dublin, Tex	C. C. Baxter	100W	Unlimited.
KFXR	Oklahoma City, Okla	Exchange Avenue Baptist Church	100W 250-W-LS	Do.
WKBS	Galesburg, Ill	Permil N. Nelson	100W	Do.
WCLS	Joliet, Ill	WCLS (Inc.)	100W	Shares with WKBB.
WKBB	do	Sanders Brothers Radio Station	100W	Shares with WCLS.
KWCR	Cedar Rapids, Iowa	Harry F. Parr	100W	Shares with KFGQ and KFJY.
KFJY	Fort Dodge, Iowa	C. S. Tunwall	100W	Shares with KFGQ and KWCR.
KFGQ	Boone, Iowa	Boon Biblical College	100W	Shares with KWCR and KFJY.
KGFW	Ravenna, Nebr	Central Nebraska Broadcasting Corporation.	100W	Unlimited.
WBOW	Terre Haute, Ind	Banks of Wabash (Inc.)	100W	Do.
WJAK	Marion, Ind	Marion Broadcast Co	50W	Shares with WLBC.
WLBC	Muncie, Ind	Donald A. Burton	50W	Shares with WJAK.
KGBX	St. Joseph, Mo	KGBX (Inc.)	100W	Unlimited.
KFIU	Juneau, Alaska	Alaska Electric Light & Power Co	10W	Do.
KFBK	Sacramento, Calif	James McClatchy Co	100W	Do.
KCRJ	Jerome, Ariz	Charles C. Robinson	100W	Do.
KGCX	Wolf Point, Mont	First State Bank of Vida	100W 250W-LS	One-half time.
KGEZ	Kalispell, Mont	Donald C. Treloar and Stanley R. Church doing business as Treloar-Church Broadcasting Co.	100W	Unlimited.
KFUP	Denver, Colo	Fitzsimons General Hospital, U. S. Army	100W	Shares with KFXJ.
KFXJ	Edgewater, Colo.[23]	R. G. Howell and Charles Howell, doing business as Western Slope Broadcasting Co.	50W	Shares with KFUP.

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[19] C. P. to increase power to 100 watts.
[20] C. P. to increase power to 250 watts-LS.
[21] C. P. to increase power to 100 watts.
[22] C. P. to increase power to 100 watts.
[23] C. P. to move transmitter and studio to Grand Junction, Colo., and increase power to 100 Wats.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1310 KILOCYCLES—Continued

Call letters	Main studio location	Licensee	Power	Time of operation
KMED	Medford, Oreg.	Mrs. W. J. Virgin	50W	Unlimited.
KXRO	Aberdeen, Wash.	KXRO (Inc.)	75W [24]	Do.
KIT	Yakima, Wash	Carl E. Haymond.	50W	Do.

1320 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WADC	Tallmadge, Ohio	Allen T. Simmons	1KW	Unlimited.
WSMB	New Orleans, La	Saenger Theatres (Inc.) and Maison Blanche Co.	500W	Do.
KTFI	Twin Falls, Idaho	Radio Broadcasting Corporation	250W [25]	Shares with KID at night.
KID	Idaho Falls, Idaho	KID Broadcasting Co	250W 500W–LS	Shares with KTFI at night.
KGHF	Pueblo, Colo	Curtis P. Ritchie and Joe E. Finch	250W 500W–LS	Unlimited.
KGMB	Honolulu, Hawaii	Honolulu Broadcasting Co. (Ltd.)	500W	Do.

1330 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WDRC	Hartford, Conn. T—Bloomfield, Conn.	The Doolittle Radio Corporation	500W	Unlimited.
WSAI	Cincinnati, Ohio. T—Mason, Ohio.	Crosley Radio Corporation (lessee)	500W	Do.
WTAQ	Eau Claire, Wis. T—Township of Washington, Wis.	Gillette Rubber Co	1KW	Shares with KSCJ.
KSCJ	Sioux City, Iowa	Perkins Brothers Co	1KW 2½KW–LS	Shares with WTAQ.
KGB	San Diego, Calif.	Pickwick Broadcasting Corporation	250W [26]	Unlimited.

1340 KILOCYCLES

WSPD	Toledo, Ohio	Toledo Broadcasting Co	500W 1KW–LS	Unlimited.
KFPW	Fort Smith, Ark	Southwestern Hotel Co	50W	Daytime.
WCOA	Pensacola, Fla	City of Pensacola, Fla	500W	Unlimited.
KFPY	Spokane, Wash	Symons Broadcasting Co	1KW	Do.

1350 KILOCYCLES

WAWZ	Zarephath, N. J	Pillar of Fire	250W	Shares with WMSG, WCDA, and WBNX. (C. P. only.)
WMSG	New York, N. Y	Madison Square Garden Broadcast Corporation.	250W	Shares with WAWZ, WCDA, and WBNX.
WCDA	New York, N. Y. T—Cliffside Park, N. J.	Italian Educational Broadcasting Co. (Inc.).	250W	Shares with WAWZ, WMSG, and WBNX.
WBNX	New York, N. Y	Standard Cahill Co. (Inc.)	250W	Shares with WAWZ, WMSG, and WCDA.
KWK	St. Louis, Mo. T—Kirkwood, Mo.	Greater St. Louis Broadcasting Corporation.	1KW	Unlimited.

1360 KILOCYCLES

WFBL	Syracuse, N. Y.[27]	Onondaga Radio Broadcasting Corporation.	1KW	Unlimited.
WQBC	Vicksburg, Miss	Delta Broadcasting Co. (Inc.)	300W	Daytime. (C. P. only.)
WCSC	Charleston, S. C	Fred Jordon and Lewis Burk	500W	Unlimited.
WJKS	Gary, Ind	Johnson-Kennedy Radio Corporation	1KW 1¼KW–LS	Shares with WGES.
WGES	Chicago, Ill	Oak Leaves Broadcasting Station (Inc.)	500W 1KW–LS[28]	Shares with WJKS.
KGIR	Butte, Mont	KGIR (Inc.)	500W	One-half time.
KGER	Long Beach, Calif	C. Merwin Dobyns	1KW	Shares with KPSN.
KPSN	Pasadena, Calif	Pasadena Star-News Publishing Co	1KW	Shares with KGER.

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[24] C. P. to increase power to 100 watts.

[25] C. P. to increase power to 500 watts—LS.

[26] C. P. to increase power to 500 watts.

[27] C. P. to move transmitter to Collamer, N. Y., and increase power to 2½ KW-LS.

[28] On Sundays.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1370 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WRDO	Augusta, Me	Albert S. Woodman	100W	Unlimited (C. P. only).
WQDM	St. Albans, Vt	A. J. St. Antoine	5W [29]	Daytime.
WLEY	Lexington, Mass	Carl S. Wheeler, trading as Lexington Air Stations.	100W 250W–LS	One-half time.
WSVS	Buffalo, N. Y	Elmer S. Pierce, principal, Seneca Vocational High School.	50W	Unlimited.
WBGF	Glens Falls, N. Y	W. Neal Parker and Herbert H. Metcalfe	50W	Do.
WPOE	Patchogue, N. Y	Nassau Broadcasting Corporation	100W	Do.
WCBM	Baltimore, Md	Baltimore Broadcasting Corporation	100W 250W–LS	Do.
WBTM	Danville, Va	L. H., R. G., and A. S. Clarke, doing business as Clarke Electric Co.	100W	Shares with WLVA.
WLVA	Lynchburg, Va	Lynchburg Broadcasting Corporation	100W	Shares with WBTM.
WHBD	Mount Orab, Ohio	F. P. Moler	100W	Unlimited.
WHDF	Calumet, Mich	Upper Michigan Broadcasting Co	100W 250W–LS	Do.
WJBK	Highland Park, Mich	James F. Hopkins (Inc.)	50W	Shares with WIBM.
WIBM	Jackson, Mich	WIBM (Inc.)	100W	Shares with WJBK.
WRAK	Williamsport, Pa.	Clarence R. Cummins	50W [30]	Unlimited.
WELK	Philadelphia, Pa	WELK Broadcasting Station (Inc.)	100W 250W–LS	Do.
WFDV	Rome, Ga	Dolies Goings	100W	Do.
WRBJ	Hattiesburg, Miss	Woodruff Furniture Co. (Inc.)	10W	Do.
WHBQ	Memphis, Tenn	Broadcasting Station WHBQ (Inc.)	100W	Do.
WRBT	Wilmington, N. C	Wilmington Radio Association (Inc.)	100W	Do.
KGFG	Oklahoma City, Okla	Oklahoma Broadcasting Co. (Inc.)	100W	Shares with KCRC.
KCRC	Enid, Okla	Champlin Refining Co	100W 250W–LS	Shares with KGFG.
WMBR	Tampa, Fla	F. J. Reynolds	100W	Unlimited.
KMAC	San Antonio, Tex	W. W. McAllister	100W	Shares with KONO.

KFJZ	Fort Worth, Tex	Margaret Meacham Hightower, Minnie Meacham Smith, and Mary Meacham, executrices of estate of H. C. Meacham, deceased.	100W	Unlimited.
KONO	San Antonio, Tex	Mission Broadcasting Co	100W	Shares with KMAC.
KGKL	San Angelo, Tex	KGKL (Inc.)	100W	Unlimited.
KFLX	Galveston, Tex	George Roy Clough	100W	Do.
WGL	Fort Wayne, Ind	Fred C. Zeig (Allen-Wayne Co.)	100W	Do.
KGDA	Mitchell, S. Dak	Mitchell Broadcasting Corporation	100W	Do.
KFJM	Great Forks, N. Dak	University of North Dakota	100W	Do.
KWKC	Kansas City, Mo	Wilson Duncan, trading as Wilson Duncan Broadcasting Co.	100W	One-half time.
WRJN	Racine, Wis	Racine Broadcasting Corporation	100W	Unlimited.
KGAR	Tucson, Ariz	Tucson Motor Service Co	100W 250W–LS	Do.
KRE	Berkeley, Calif	First Congregational Church of Berkeley	100W	Shares with KZM.
KZM	Hayward, Calif	Leon P. Tenney	100W	Shares with KRE.
KOOS	Marshfield, Oreg	H. H. Hanseth (Inc.)	100W	Unlimited.
KFBL	Everett, Wash	Otto Leese and Robert Leese doing business as Leese Bros.	50W	Shares with KVL.
KVL	Seattle, Wash	KVL, Incorporated	100W	Shares with KFBL.
KFJI	Astoria, Oreg	KFJI Broadcasters, Inc	100W	Unlimited.
KGFL	Raton, N. Mex	W. E. Whitmore	50W	Do.
KUJ	Walla Walla, Wash	Paul R. Heitmeyer	100W	One-half time (C. P. only).

1380 KILOCYCLES

WSMK	Dayton, Ohio	Stanley M. Krohn, jr	200W	Shares with KQV at night.
KQV	Pittsburgh, Pa	Doubleday-Hill Electric Co	500W	Shares with WSMK at night.
KSO	Clarinda, Iowa	Berry Seed Co	500W	Shares with WKBH.
WKBH	LaCrosse, Wis	WKBH (Inc.)	1KW	Shares with KSO.
KOH	Reno, Nev	Jay Peters (Inc.)	500W	Unlimited.

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[29] C. P. to increase power to 100 watts.

[30] C. P. to increase power to 100 watts.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1390 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WHK	Cleveland, Ohio. T—Seven Hills, Ohio.	Radio Air Service Corporation	1KW	Unlimited.
KLRA	Little Rock, Ark	Arkansas Broadcasting Co	1KW	Shares with KUOA.
KUOA	Fayetteville, Ark	University of Arkansas	1KW	Shares with KLRA.
KOY	Phoenix, Ariz	Nielsen Radio and Sporting Goods Co	500W	Unlimited.

1400 KILOCYCLES

WCGU	Brooklyn, N. Y	United States Broadcasting Corporation	500W	Shares with WFOX, WLTH, and WBBC.
WFOX	do	Paramount Broadcasting Corporation	500W	Shares with WCGU, WLTH, and WBBC.
WLTH	do	Voice of Brooklyn (Inc.)	500W	Shares with WFOX, WCGU, and WBBC.
WBBC	do	Brooklyn Broadcasting Corporation	500W	Shares with WFOX, WLTH, and WCGU.
KOCW	Chickasha, Okla	Oklahoma College for Women	250W 500W-LS	Unlimited.
WCMA	Culver, Ind	General Broadcasting Corporation	500W	Shares with WBAA and WKBF.
WKBF	Indianapolis, Ind. T—Clermont, Ind.	Indianapolis Broadcasting (Inc.)	500W	Shares with WBAA and WCMA.
WBAA	West Lafayette, Ind	Purdue University	500W 1KW-LS	Shares with WCMA, and WKBF.
KLO	Ogden, Utah	Peery Building Co	500W	Unlimited.

1410 KILOCYCLES

WLEX	Lexington, Mass	Bay State Broadcasting Corporation	500W	Shares with WMAF and WSSH.
WMAF	South Dartmouth, Mass	Round Hills Radio Corporation	500W	Shares with WLEX and WSSH.
WSSH	Boston, Mass	Tremont Temple Baptist Church	500W	Shares with WLEX and WMAF.
WRBX	Roanoke, Va	Richmond Development Corporation	250W	One-half time.
WBCM	Bay City, Mich. T—Hampton Township, Mich.	Jas. E. Davidson	500W	Unlimited.
KGRS	Amarillo, Tex	E. B. Gish (Gish Radio Service)	1KW	Shares with WDAG.
WDAG	do	National Radio Broadcasting Corporation	250W[31]	Shares with KGRS.
WODX	Mobile, Ala. T—Springhill, Ala.	Mobile Broadcasting Corporation	500W	Shares with WSFA.
WSFA	Montgomery, Ala	Montgomery Broadcasting Co. (Inc.)	500W	Shares with WODX.
KFLV	Rockford, Ill	Rockford Broadcasters (Inc.)	500W	Shares with WHBL.
WHBL	Sheboygan, Wis	Press Publishing Co	500W	Shares with KFLV.

1420 KILOCYCLES

WHDL	Tupper Lake, N. Y	Tupper Lake Broadcasting Co. (Inc.)	10W[32]	Daytime.
WTBO	Cumberland, Md	Associated Broadcasting Corporation	100W 250W–LS	Unlimited.
WILM	Wilmington, Del. T—Edge Moor, Del.	Delaware Broadcasting Co. (Inc.)	100W	Do.
WPAD	Paducah, Ky	Pierce E. Lackey and S. Houston McNutt, doing business as Paducah Broadcasting Co.	100W	Do.
WEDH	Erie, Pa	Erie Dispatch-Herald Broadcasting Corporation.	100W	Do.
WMBC	Detroit, Mich	Michigan Broadcasting Co	100W 250W–LS	Do.

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[31] C. P. to increase power to 1 KW.

[32] C. P. to increase power to 100 watts.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1420 KILOCYCLES—Continued

Call letters	Main studio location	Licensee	Power	Time of operation
WELL	Battle Creek, Mich	Enquirer-News Co	50W [33]	Unlimited.
WHIS	Bluefield, W. Va	Daily Telegraph Printing Co	100W [34]	Do.
WIBR	Steubenville, Ohio	George W. Robinson	50W	One-half time.
WFDW	Talladega, Ala	Raymond C. Hammett	100W	Unlimited.
WJBO	New Orleans, La	Valdemar Jensen	100W	Do.
KGFF	Alva, Okla.[35]	D. R. Wallace (owner KGFF Broadcasting Co.)	100W	Do.
KTAP	San Antonio, Tex	Alamo Broadcasting Co. (Inc.)	100W	Do.
KXYZ	Houston, Tex	Harris County Broadcast Co	100W	Do.
KFYO	Abilene, Tex	T. E. Kirksey, trading as Kirksey Brothers.	100W 250W–LS	Do.
WSPA	Spartanburg, S. C	Virgil V. Evans, trading as The Voice of South Carolina.	100W 250W–LS	Do.
KICK	Red Oak, Iowa	Red Oak Radio Corporation	100W	Do.
WIAS	Ottumwa, Iowa	Iowa Broadcasting Co	100W	Do.
WLBF	Kansas City, Kans	The WLBF Broadcasting Co	100W	Do.
WMBH	Joplin, Mo	Edwin Dudley Aber	100W 250W–LS	Do.
KLPM	Minot, N. Dak	John B. Cooley	100W	Do.
WEHS	Evanston, Ill	WEHS (Inc.)	100W	Shares with WKBI and WHFC.
WHFC	Cicero, Ill	Triangle Broadcasters	100W	Shares with WKBI and WEHS.
WKBI	Chicago, Ill	Fred L. Schoenwolf	100W	Shares with WHFC and WEHS.
KFIZ	Fond du Lac, Wis	The Reporter Printing Co	100W	Unlimited.
KFXY	Flagstaff, Ariz	Mary M. Costigan	100W	Do.
KGIX	Las Vegas, Nev	J. M. Heaton	100W	Do.
KFQU	Holy City, Calif	W. E. Riker	100W	Shares with KGGC.
KFXD	Nampa, Idaho	Frank E. Hurt, trading as Service Radio Co.	50W	Unlimited.
KGIW	Trinidad, Colo	Leonard E. Wilson	100W	Do.
KGKX	Sandpoint, Idaho	C. E. Twiss and F. H. McCann	100W	Do.

KGGC	San Francisco, Calif	The Golden Gate Broadcasting Co	100W	Shares with KFQU.
KGVO	Missoula, Mont	Mosby's (Inc.)	100W	10 a. m. to 6 p. m. (C. P. only).
KXL	Portland, Oreg	KXL Broadcasters	100W	Shares with KBPS.
KBPS	do	Benson Polytechnic School	100W	Shares with KXL.
KORE	Eugene, Oreg	Frank L. Hill and C. G. Phillips, doing business as Eugene Broadcast Station.	100W	Unlimited.
KFQW	Seattle, Wash	KFQW (Inc.)	100W	Do.

1430 KILOCYCLES

WHP	Harrisburg, Pa. T—Lemoyne, Pa.	WHP (Inc.)	500W 1KW-LS	Shares with WBAK and WCAH.
WBAK	Harrisburg, Pa	Pennsylvania State Police, Commonwealth of Pennsylvania.	500W 1KW-LS	Shares with WHP and WCAH.
WCAH	Columbus, Ohio	Commercial Radio Service Co	500W	Shares with WHP and WBAK.
WGBC	Memphis, Tenn	Memphis Broadcasting Co	500W	Shares with WNBR.
WNBR	do	do	500W	Shares with WGBC.
KGNF	North Platte, Nebr	Herbert Logan Spencer	500W	Daytime.
KECA	Los Angeles, Calif	Pacific Development Radio Co	1KW	Unlimited.

1440 KILOCYCLES

WHEC-WABO	Rochester, N. Y	Hickson Electric & Radio Corporation	500W	Shares with WOKO.
WOKO	Poughkeepsie, N. Y. T—Mount Beacon, N. Y.[36]	WOKO (Inc.)	500W	Shares with WHEC-WABO.
WCBA	Allentown, Pa	B. Bryan Musselman	250W	Shares with WSAN.
WSAN	do	Allentown Call Publishing Co. (Inc.)	250W	Shares with WCBA.
WBIG	Greensboro, N. C	North Carolina Broadcasting Co. (Inc.)	500W	Unlimited.
WTAD	Quincy, Ill	Illinois Stock Medicine Broadcasting Corporation.	500W	Shares with WMBD.
WMBD	Peoria Heights, Ill	E. M. Kahler (owner Peoria Heights Radio Laboratory).	500W 1KW-LS	Shares with WTAD.
KLS	Oakland, Calif	E. N. and S. W. Warner, doing business as Warner Bros.	250W	Daytime.

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[33] C. P. to increase power to 100 watts.

[34] C. P. to increase power to 250 watts, to change frequency to 1410 kilocycles, to operate one-half time.

[35] C. P. to move studio and transmitter to Shawnee, Okla.

[36] C. P. to move transmitter and studio to Albany, N.Y.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1450 KILOCYCLES

Call letters	Main studio location	Licensee	Power	Time of operation
WBMS	Hackensack, N. J	WBMS Broadcasting Corporation	250W	Shares with WNJ, WHOM, and WKBO.
WNJ	Newark, N. J	Radio Investment Co., (Inc.)	250W	Shares with WBMS, WHOM, and WKBO.
WHOM	Jersey City, N. J	New Jersey Broadcasting Corporation	250W	Shares with WNJ, WBMS, and WKBO.
WKBO	do	Camith Corporation	250W	Shares with WNJ, WHOM, and WBMS.
WSAR	Fall River, Mass	Doughty & Welch Electric Co. (Inc.)	250W	Unlimited.
WGAR	Cleveland, Ohio	WGAR Broadcasting Co	500W	Do.
WTFI	Toccoa, Ga	Toccoa Falls Institute	500W	Do.
KTBS	Shreveport, La	Tri State Broadcasting System (Inc.)	1KW	Do.
WJSV	Alexandria, Va. T—Mt. Vernon Hills, Va.	Independent Publishing Co	10KW	Do.
KSTP	St. Paul, Minn. T—Westcott, Minn.	National Battery Broadcasting Co	10KW	Do.

1470 KILOCYCLES

WLAC	Nashville, Tenn	Life and Casualty Insurance Co	5KW	Unlimited.
KGA	Spokane, Wash	Northwest Broadcasting System (Inc.)	5KW	Do.

1480 KILOCYCLES

WKBW	Buffalo, N. Y. T—Amherst, N. Y.	WKBW (Inc.)	5KW	Unlimited.
KFJF	Oklahoma City, Okla	National Radio Manufacturing Co	5KW	Do.

1490 KILOCYCLES

WCKY	Covington, Ky. T—Crescent Springs, Ky.	L. B. Wilson (Inc.)	5KW	Shares with WJAZ and WCHI.
WJAZ	Mt. Prospect, Ill	Zenith Radio Corporation	5KW	Shares with WCKY and WCHI.
WCHI	Chicago, Ill. T—Batavia, Ill.	Peoples Pulpit Association	5KW	Shares with WJAZ and WCKY.

1500 KILOCYCLES

WMBA	Newport, R. I	LeRoy Joseph Beebe	100W	Unlimited.
WLOE	Boston, Mass. T—Chelsea, Mass.	Boston Broadcasting Co	100W 250W-LS	One-half time.
WNBF	Binghamton, N. Y	Howitt-Wood Radio Co. (Inc.)	100W	Unlimited.
WMBQ	Brooklyn, N. Y	Paul J. Gollhofer	100W	Shares with WLBX, WCLB, and WWRL.
WCLB	do	Arthur Faske	100W	Shares with WLBX, WMBQ, and WWRL (C. P. only).
WLBX	Long Island City, N. Y	John N. Brahy	100W	Shares with WMBQ, WCLB, and WWRL.
WWRL	Woodside, N. Y	Long Island Broadcasting Corporation	100W	Shares with WMBQ, WLBX, and WCLB.
WSYB	Rutland, Vt	H. E. Seward, jr., and Philip Weiss, doing business as Seward & Weiss Music Co.	100W	Unlimited.
WKBZ	Ludington, Mich	Karl L. Ashbacker	50W	Do.
WMPC	Lapeer, Mich	First Methodist Protestant Church of Lapeer.	100W	Do.
WPEN	Philadelphia, Pa	Wm. Penn Broadcasting Co	100W 250W-LS	Do.
WWSW	Pittsburgh, Pa	William S. Walker	100W	Unlimited (C. P. only).
WOPI	Bristol, Tenn	Radiophone Broadcasting Station WOPI (Inc.).	100W	Unlimited.
WDIX	Tupelo, Miss	North Mississippi Broadcasting Corporation.	100W	Do.
WRDW	Augusta, Ga	Musicove (Inc.)	100W	Do.

BROADCASTING STATIONS BY FREQUENCIES—Continued

1500 KILOCYCLES—Continued

Call letters	Main studio location	Licensee	Power	Time of operation
KGFI	Corpus Christi, Tex	Eagle Broadcasting Co. (Inc.)	100W 250W–LS	Unlimited.
KUT	Austin, Tex	Rice Hotel	100W	Do.
KGKB	Brownwood, Tex	E. M., C. T., and E. E. Wilson, doing business as Eagle Publishing Co.	100W	Do.
KGIZ	Grant City, Mo.	Grant City Park Corporation	50W[37]	Do.
KGKY	Scottsbluff, Nebr.	Hilliard Co. (Inc.)	100W	Do.
WKBV	Connersville, Ind	William O. Knox, trading as Knox Battery & Electric Co.	100W 150W–LS	Do.
KGFK	Moorhead, Minn	Red River Broadcasting Co. (Inc.)	50W	Do.
KPJM	Prescott, Ariz	A. P. Miller and George R. Klahn, doing business as Miller & Klahn.	100W	Do.
KXO	El Centro, Calif	E. R. Irey and F. M. Bowles	100W	Do.
KDB	Santa Barbara, Calif	Dwight Faulding	100W	Do.
KREG	Santa Ana, Calif	Pacific-Western Broadcasting Federation (Ltd.).	100W	Do.
KPQ	Wenatchee, Wash	Wescoast Broadcasting Co	50W	Do.

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[37] C. P. to increase power to 100 watts.

340 Federal Radio Commission, Washington, D. C.

Examiner's Report No. 224.

This report is not final but is subject to approval, modification or rejection by the Commission. The parties to the proceedings have fifteen days, with the exception of those from the Fifth Zone who have twenty days, in which to file objections or exceptions, if any, to the report.

Docket No. 1152.

In re Application of James E. Davidson (WBCM), Bay City, Michigan, for Modification of License.

	Present assignment.	Assignment requested.
Frequency	1,410 Kc.	940 Kc.
Power	500 watts.	500 watts.
Hours of Operation	Unlimited	Unlimited.

The above case was heard April 24, 1931.

Howard LeRoy appeared on behalf of applicant.

Paul M. Segal and Horace L. Lohnes appeared on behalf of WHA.

George O. Sutton and George R. Porter appeared on behalf of WFIW.

Paul M. Segal appeared on behalf of Station WCSH.

Frank D. Scott appeared on behalf of WWJ.

Ben S. Fisher appeared for the Commission.

This is an application for modification of station license. James E. Davidson, licensee and applicant in this case, requests that the license of radio broadcast station WBCM, Bay City, Michigan, be modified to specify the 940 kc. frequency in lieu of the 1410 kc. frequency.

The Evidence.

Station WBCM and WSKC, its predecessor, have been operated under successive licenses since June, 1925. WSKC, as the station was formerly known, was purchased by the applicant in August, 1928. New modern equipment was installed and the call letters of the station were changed to WBCM. The station now represents an investment of approximately $75,000 in such tangible property as land, buildings and equipment. The approximate operating and maintenance cost is $72,000 a year.

341 WBCM employs a standard Western Electric D-88137 transmitter which is located on Tuscola Road about one-half mile outside the city limits of Bay City. The main studio is located in the Wenonah Hotel and is equipped with standard Western Electric studio equipment.

A full-time operating personnel of eight persons is maintained. Programs average 77 hours of Columbia chain programs and 28 hours of local programs, or a total of 105 hours a week.

Immediately following the general reallocation of November 11, 1928, and until about January, 1930, the present frequency assignment was considered quite satisfactory. The nearest stations then assigned to the 1410 kc. frequency were the following:

Location.	Power.	Geographical separation.
(WHBL, Sheboygan, Wisconsin.	500 watts	180 miles
(KFLV, Rockford, Illinois	“ “	260 miles
(WDGY, Minneapolis, Minn.	“ “	475 miles
(WHDI, “ “	“ “	“ “
WDEL, Wilmington, Delaware.	500 watts	520 miles
(KGRS, Amarillo, Texas	1,000 “	1,130 “
(WDAC, “ “	1,000 “	1,130 “

Subsequently, the following stations were assigned to the same frequency:

(WMAF, Boston, Mass.	500 watts	660 miles
(WSSH, “ “	“ “	“ “
(WLEX, “ “	“ “	“ “
(WHIS, Bluefield, West Virginia	250 “	480 “
(WRBX, Roanoke, Virginia	“ “	510 “
(WSFA, Montgomery, Alabama.	500 “	820 “
(WODX, Mobile, Alabama	500 “	960 “

and WDGY, WHDI and WDEL were assigned to other frequencies.

The service area of WBCM in 1929, as estimated by Ralph Carpenter, chief engineer of the station, from a study of fan mail, and about half a dozen listening tests, was approximately 85 miles in radius. The present service area is estimated to have a radius of nine miles, the limiting factor being severe heterodyne interference. The reduction or loss in population served is estimated at 90 per cent. Failure of the station to deliver a good service in Saginaw, Michigan, eleven miles distant, works a serious handicap on the station since the bulk of its business has been obtained from that city.

342 Observations made by Mr. Carpenter over a period of six days at seven different points on the outer limits of the estimated 1929 service area (radius 85 miles) show the following conditions with respect to the 1410 kc. and 940 kc. frequencies: As early as 4 o'clock p. m., a heterodyne attributed to WMBC, Detroit, causes serious interference on the 1410 kc. frequency. From six until midnight, the heterodyne interference is so terrific that programs are not audible and so complex that the particular station causing it, cannot be identified. On the 940 kc. frequency, no station may be heard until 7:30 to 8:00 o'clock.

A Western Electric 4-D receiver, modified so as to make it possible to use the second detector as a local oscillator, was used in detecting the carrier waves and a commercial 1931 Philco broadcast receiver was used for the purpose of determining whether or not any of the stations assigned to the frequencies involved, delivered a signal of sufficient strength to be heard on an ordinary receiver. One carrier was identified as WFIW and another carrier was identified once during the seven nights as WDAY. While the call letters of WFIW were heard frequently on the Western Electric superheterodyne receiver, they could not be heard on the Philco set. Also, a 50 cycle heterodyne audible on the Western Electric when two carriers were present could not be heard on the Philco. WCSH, Portland, Maine, could not be heard at any time and the call letters of WDAY, Fargo, North Dakota, were only heard on one occasion.

WSFA and WODX, Alabama stations, are heard on occasions in Bay City with loud speaker volume. These stations and WRBX, Roanoke, Virginia, are known to be sources of interference in WBCM's service. The nearest stations assigned to the same frequency, namely, WHBL, Sheboygan, Wisconsin, and KFLV, Rockford, Illinois, have not been identified as sources of interference.

The testimony of Robert D. Linx, chief engineer of Station WFIW, shows the following: WFIW, Hopkinsville, Kentucky, 515 miles southwest of Bay City, is assigned to the 940 kc. frequency and operates with a power of 1000 watts. A better signal is delivered in a north and south direction than in other directions. On the occasion of a blizzard in North Dakota in November, 1930, it was found necessary for WFIW to sign off in order to make it possible for WDAY, the Fargo, North Dakota station assigned to the 940 kc. frequency, to handle communications while wire communications were disrupted. Similarly, stations located in the Great Lakes region are heard with relatively high volume in a southern direction. WBCM is heard frequently in Hopkinsville and in Nashville, Tennessee. The simultaneous operation of WBCM and WFIW during night hours on 940 kilocycles, would be expected from an engineering viewpoint to result in serious heterodyne interference limiting the service area of both stations.

Station WFIW is owned and operated by WFIW, Inc., a corporation owned by stockholders of the Acme Mills. It operates 12 hours a day and serves a population scattered over a relatively large area. Programs feature plays, orchestras, farm talks, church services, two hours of phonograph records a day, a psychologist who answers questions and sells books, and various sponsored programs.

343 The testimony of William L. Foss, chief engineer of Station WCSH, shows the following facts with reference to WCSH and operating conditions bearing on the interference question raised by this application:

WCSH, Portland, Maine, is licensed to operate on the 940 kc. frequency with a power of 1 kw. The geographical separation is 680 miles. Numerous checks made by Mr. Foss indicate that every station of 500 watts and over, located in the general area in which Bay City is situated, delivers a carrier wave in Maine. Interference caused by WTMJ, Milwaukee, is observed in the service of WLBZ, Bangor, Maine; WNAC is limited by interference caused by WSBT, South Bend, Indiana; and WLEX, Lexington, a station assigned to the 1410 kc. frequency, is badly heterodyned, apparently by WBCM.

The area in which WCSH delivers a 500 microvolt per meter or greater field intensity as determined by 872 field strength measurements and observations made over a period of three seasons, is between thirty and forty miles in radius. The population within this area numbers 281,708. Also, there are many listeners in the interior of the state not in position to receive a signal of the field strength generally considered necessary for good reception who find a field intensity much lower than 500 microvolts per meter acceptable.

The population within the area circumscribed by the 2,000 microvolt per meter limit numbers 85,000. Mr. Foss estimates that the service of the station would be limited to this population by heterodyne interference if WBCM is permitted to operate on the 940 kc. frequency.

Station WCSH was established in 1925. It is owned and operated by the Congress Square Hotel Company, which has an investment of approximately $180,000 in the equipment of the station. In May, 1930, a new type 1005-B RCA transmitter was installed at a cost of about $120,000. Antenna towers are Milliken design, 300 feet high, spaced 600 feet apart.

Twelve employees, exclusive of artists, are employed in the operation of WCSH. Programs broadcast include chain programs distributed by the National Broadcast Company and such local features as organ recitals, religious services, educational lectures and program material furnished by the Maine Publicity Bureau and other similar organizations.

The testimony of A. D. Ring, Commission Engineer, with respect to the possibility of interference on the 940 kc. frequency resulting from the operation of WBCM on that frequency, discloses the following facts: The actual geographical separation between WBCM and the stations assigned to the 940 kc. frequency is much less in each instance than the separation of 1050 miles considered necessary under average conditions to prevent interference in the good service areas of the stations involved. Also, the geographical separation between WBCM and WWJ, Detroit, is much less than the 150-mile separation required under average conditions to prevent cross-talk interference where the kilocycle separation is only 20 kilocycles.

344 The separation between stations proposed in this application is indicated in the following table:

Station.	Location.	Power.	Distance from Bay City.
WFIW	Hopkinsville, Ky.	1 K.W.	515 miles.
WCSH	Portland, Me.	"	680 "
WDAY	Fargo, N. D.	"	690 "
WWJ	Detroit, Mich. (920 kcs.)	"	95 "

In the opinion of Mr. Ring, it would not be possible for WBCM to have an interference free service area with a radius of 85 miles on the 1410 kc frequency with the Sheboygan, Wisconsin, and Rockford, Illinois, stations assigned to that frequency or on the 940 kc frequency under the conditions now existing on that frequency.

Conclusions and Recommendation.

The service of Station WBCM is undoubtedly limited seriously by interference conditions affecting the operation of stations licensed to operate with a frequency of 1410 kc. There is a possibility that this situation would be relieved to some extent by the proposed change in frequency to 940 kc. This change, however, would impair the service of three other stations assigned to the 940 kc frequency and of one station assigned to an adjacent frequency.

WDAY, Fargo, North Dakota; WFIW, Hopkinsville, Kentucky; and, WCSH, Portland, Maine, are located in districts where their value to the public is largely dependent on their ability to cover a large area and so reach a scattered rural population. WCSH is shown by the evidence to represent a considerable investment. Its service has been developed and improved over a long period and is no doubt a distinct asset to its community and state. WFIW provides a varied program for a population distributed over a relatively large area. Each of the three stations is located some distance from any other station of similar character. The evidence shows that all three would be limited in their service by heterodyne interference if this application is granted and WBCM is operated on the 940 kc. frequency.

The geographical separation between stations assigned to the same frequency is not, of course, the only factor which may affect operating conditions and service areas. It is apparent, however, from the evidence in this case that this factor does have a very direct bearing on the coverage obtained by the stations considered. In this case, the three stations assigned to the 940 kc. frequency are so situated that the assignment of WBCM to that frequency would substantially reduce the advantage in geographical separation now held by each station. The stations assigned to the 1410 kc. frequency are so situated that the removal of WBCM to another frequency would increase the geographical 345 separation for two part-time stations only (one station assignment).

It is considered that any possible improvement in the service of WBCM resulting from the granting of this application, would be far outweighed by the adverse effect it would have on other services.

The operating assignment requested is not as a matter of fact available under the terms of General Order No. 40 in view of the interference conditions found to exist.

It is recommended that the application be *denied*.

R. H. HYDE,
Examiner.

Submitted July 15, 1931.

346 Federal Radio Comm., Jul. 31, 1931, Received 2nd Mail, Mail and Files.

Federal Radio Commission, Washington, D. C.

Docket No. 1152.

In re Application of JAMES E. DAVIDSON (WBCM), Bay City, Michigan, for Modification of License.

SIRS:

Please take notice that conformably to General Order No. 93, Subtitle D, Section 4(b), written request is hereby made on behalf of James E. Davidson, applicant exceptant, herein, for oral argument of the accompanying exceptions to Examiner's Report No. 224 before a quorum of the Commission.

HOWARD S. LeROY,
Attorney for Applicant-Exceptant,
400 *Hibbs Building,*
Washington, D. C.

Dated July 31, 1931.

To Federal Radio Commission, Washington, D. C.

District of Columbia, *ss:*

Howard S. LeRoy, being duly sworn deposes and says; that he is attorney for James E. Davidson, owner and operator of Station WBCM of Bay City, Michigan, the applicant-exceptant herein; and that conformably to General Order No. 93, Subtitle D, Section 4(b) a copy of the exceptions to the Examiner's Report No. 224, and the request for oral argument, hereto attached, have been mailed to every other party participating in the hearing.

HOWARD S. LeROY,
Attorney for Applicant-Exceptant.

Subscribed and sworn to before me, a Notary Public in and for the District of Columbia, this 31st day of July, 1931.

[Seal of C. Ell Wills, Notary Public, District of Columbia.]

C. ELL WILLS.

347 Federal Radio Commission. Received Jul. 31, 1931.
James W. Baldwin, Secretary.

Federal Radio Commission, Washington, D. C.

Docket No. 1152.

In re Application of James E. Davidson (WBCM), Bay City, Michigan, for Modification of License.

	Present assignment.	Assignment requested.
Frequency	1,410 kc.	940 kc.
Power	500 watts	500 watts
Hours of Operation	Unlimited	Unlimited

Applicant's Exceptions to Examiner's Report No. 224.

Exceptions on behalf of applicant, James E. Davidson (WBCM), to the report (No. 224) of Examiner R. H. Hyde, submitted July 15, 1931, denying application for modification of license of Station WBCM, and notified to applicant's counsel by letter from the Secretary of the Federal Radio Commission dated July 17, 1931.

1. Because the said Examiner concluded that

"The service of Station WBCM is undoubtedly limited seriously by interference conditions affecting the operation of stations licensed to operate with a frequency of 1410 kc." (Examiner's Report p. 5);

whereas he should have found that the service area of WBCM has been almost blotted out since January 1930 by severe heterodyne interference, leaving applicant to serve but ten per cent of the population in its former service area and seriously threatening the large investment in the Station (Transcript pp. 9, 10, 12, 18, 48).

2. Because the said Examiner, although evidence was clear, failed to find definitely as to the cause of said smothering of service area; whereas he should have found that the 90% loss of service in area and population 348 subsequent to January 1930 was due to successive allocations to the 1410 kc. frequency by the Commission of seven additional stations located in Massachusetts, West Virginia, Virginia and Alabama (Examiner's Report p. 2).

3. Because said Examiner, in spite of evidence (Transcript pp. 17, 18), failed to find the circumstances under which the Commission made the additional allocations; whereas he should have found that the additional allocations after January 1930 were made by the Commission without notice to the applicant, and without any opportunity to the applicant to appear and defend its service area as it then existed.

4. Because the said Examiner concluded (Examiner's Report p. 5) that, although the proposed shift in frequency would relieve the situation for WBCM, it would impair the service of three other stations assigned to the 940 kc. frequency and of Station WWJ, Detroit, assigned to the 920

kc. frequency; whereas, on the evidence offered (Transcript p. 26), he should have concluded that the proposed shift in frequency would have effected an approximate restoration of the former service area of which the applicant station was unjustly deprived, and that such restoration would not materially impair the service of the three other stations now assigned to the 940 kc. frequency (Transcript pp. 23, 45, 46—Applicant's Exhibit No. 4).

5. Because the said Examiner gave undue weight to the cumulative hypothetical testimony of three of respondents' engineering experts whose opinions as to WBCM were entirely unsupported by technical field tests (Transcript pp. 77, 87, 124); whereas he should have given preponderant weight to the testimony and surveys of the applicant's engineer based on field tests and surveys on 349 both the 1410 kc. frequency and the 940 kc. frequency made after long familiarity with the area in question (Transcript pp. 19-23).

6. Because the said Examiner concluded that Station WDAY, Fargo, North Dakota, would be prejudiced by the proposed shift in frequency to the 940 kc. frequency (Examiner's Report p. 5); whereas he should have found that WDAY, although notified of the hearing, failed to make any appearance (Transcript pp. 3, 26) and offer any evidence in opposition, and hence no substantial impairment of service was to be presumed.

7. Because said Examiner gave undue weight to the location of WDAY, Fargo, North Dakota, WFIW, Hopkinsville, Kentucky, and WCSH, Portland, Maine,

"in districts where their value to the public is largely dependent on their ability to cover a large area and so reach a scattered rural population" (Examiner's Report p. 5);

whereas he should have found that WBCM was, prior to the unjustified deprivation of service area by the Commission, the only regional station in Northern and Central Michigan carrying Columbia Chain programs to the scattered rural population of that State (Transcript p. 8).

8. Because said Examiner gave excessive weight to the "considerable investment" of Station WCSH and its importance to its State and community (Examiner's Report p. 5); whereas he should have considered that the applicant Station WBCM, representing an investment of $75,000 in

land, buildings and equipment and an operating and maintenance cost of $72,000 a year, was equally an asset of the State of Michigan, and having already suffered by the
350 wrongful action of the Commission a 90% loss of its service area, it was incumbent upon him to exercise his broad discretionary powers to mitigate the over-congestion on the 1410 kc. frequency by a shift to the 940 kc. frequency in the absence of conclusive testimony that the shift would cause harmful interference.

9. Because said Examiner concluded that Station WCSH would be limited in its service by the heterodyne interference if the application was granted (Examiner's Report p. 5); whereas actual surveys and tests carried on both by the applicant Station WBCM and respondent Station WCSH show no interference (Transcript pp. 23, 124).

10. Because said Examiner, over the objection of counsel for the applicant, permitted the reading into the hearing record of a long prepared blanket statement by the engineer of Station WCSH, dealing at great length with the history and public service of the Station, little of it, however, bearing on the material question of probable interference from the applicant Station (Transcript pp. 105-123); whereas he should have ruled against the respondent Station WCSH crowding the hearing and padding the record with testimony immaterial, irrelevant, and incompetent after objection was made thereto by counsel for applicant.

11. Because the said Examiner accepted expert engineering testimony on behalf of WFIW, Hopkinsville, Kentucky, unsupported by field tests or survey, and later contradicted in part by testimony of the Commission's Engineer as to the extent of the service area of WFIW (Transcript pp. 76, 103, 104); whereas he should have given controlling weight to the expert testimony of the Chief Engineer
351 of the applicant station showing no substantial interference between Station WBCM and Station WFIW and based on field tests and surveys on the 940 kc. frequency (Transcript pp. 23, 24).

12. Because the said Examiner concluded

"that any possible improvement in the service of WBCM resulting in the granting of this application would be far outweighed by the adverse effect it would have on other services" (Examiner's Report p. 6);

whereas the sweeping generality of this conclusion is manifestly against the evidence in the record.

13. Because the said Examiner concluded that the operating assignment requested is not, as a matter of fact, available under the terms of General Order No. 40 in view of the interference conditions found to exist (Examiner's Report p. 6); whereas he should have found that the assignment is available under the exception to Paragraph C of General Order No. 40 since the expert testimony based on field tests and surveys pointed to no interference from the three stations on the 940 kc. frequency (Transcript pp. 23 & 24—Applicant's Exhibit No. 4).

14. Because the said Examiner by his Report reaffirmed the successive errors of the Commission as a matter of law in allocating seven additional stations to the 1410 kc. frequency without notice to the applicant, and without an opportunity to be heard (Transcript p. 17), and thereby without compelling reasons causing a 90% loss in facilities to the applicant; whereas he should have found that the applicant station, operated in good faith in the public service and in conformity with Commission regulations, was entitled to some form of relief within the decisions of the Court of Appeals of the District of Columbia in *Chicago* 352 *Federation of Labor* v. *Federal Radio Commission*, 41 F. (2d) 422, and the *Journal Company* v. *Federal Radio Commission*, Nos. 5163, 5268, 5269.

15. Because the said Examiner by his report reaffirmed without comment the error of the Commission in increasing the power of Station WMBC, Detroit, 90 miles away, on the adjacent frequency of 1420 kc., from 100 watts to 250 watts until local sunset causing serious interference to applicant from 4:00 P. M. to 6:00 P. M.; whereas he should have found that said increase in power was authorized by the Commission December 5, 1929, without notice to applicant, and without an opportunity to be heard, resulting in serious interference to the applicant Station WBCM then operating on 1410 kc. frequency (Transcript pp. 17, 25, 63-65).

16. Because the said Examiner, manifestly against the evidence, failed to find that the applicant in reliance upon the maintenance of its original service area made a large investment in improved equipment and plant facilities;

whereas he should have found that prior to January 1930 when the successively encroaching allocations on the 1410 kc. frequency began to be authorized by the Commission the applicant had spent some $47,000.00 in modernizing equipment and improving program service in the belief that it would have an opportunity to protect and retain its then service area of approximately 85 miles (Transcript pp. 11, 34).

17. Because the said Examiner, while finding from the evidence that Station WBCM and Station WSKC, its predecessor, have been operated under successive licenses since June, 1925, that applicant purchased said Station in August, 1928, and installed new modern equipment, that said Station represents an investment of approximately $75,000, that following the general realloca- 353 tion of November 11, 1928, and until about January, 1930, the present frequency assignment of said Station, 1410 kc., was considered quite satisfactory, when, as estimated by the Chief Engineer of said Station from a study of fan mail and field tests, its service area had a radius of approximately 85 miles, but subsequently by assignment of the same frequency to seven other stations said area was reduced to an estimated radius of 9 miles, the limiting factor being severe heterodyne interference, thereby reducing the population served by an estimated 90%, failure of said Station to deliver a good service in Saginaw, Michigan, 11 miles distant, working a serious handicap to said Station, nevertheless concludes that although there is the possibility that the frequency of 940 kc. would relieve to some extent the service affected by interference of stations now operating with a frequency of 1410 kc. yet the change would impair three other stations assigned to the 940 kc. frequency (WFIW, 515 miles distant; WCSH, 680 miles distant; and WDAY, 690 miles distant) and of one station assigned to an adjacent frequency (WWJ, 95 miles distant), whereas, if his conclusions were based upon the evidence of the actual and practical tests made by the engineer of Station WBCM rather than upon the theories and beliefs of the engineers representing the stations now operating under a frequency of 940 kc., he should have concluded that the assignment of a frequency of 940 kc. to Station WBCM would restore its original service over a

radius of approximately 85 miles without impairing to any appreciable extent the service of any other station.

HOWARD S. LE ROY,
Attorney for Applicant-Exceptant,
400-402 *Hibbs Building,*
Washington, D. C.

Dated July 31, 1931.

To Federal Radio Commission, National Press Building, Washington, D. C.

354 5459.

Federal Radio Commission, Washington, D. C.

Docket No. 1152.

In re Application of James E. Davidson (WBCM), Bay City, Michigan, for Modification of License.

Statement of Facts, Grounds for Decision, and Order of the Commission.

Preliminary Statement and the Issues.

This proceeding arose upon the application of James E. Davidson (Station WBCM), of Bay City, Michigan, for modification of station license. This station now operates on the frequency of 1410 kc. with 500 watts power and unlimited hours of operation. Authority is sought to operate on the frequency of 940 kc. with the same power and hours of operation. The application came on for hearing before an Examiner, April 24, 1931, at which Stations WHA, WFIW, WCSH and WWJ, appeared as respondents. The report of the Examiner was submitted July 15, 1931, and recommended denial of the application. Exceptions to the report were duly filed by applicant and oral argument was requested.

The issue in this case, is: Will the public interest, convenience and/or necessity be served by authorizing applicant station to operate on the frequency of 940 kc.

Statement of Facts.

Station WBCM (and WSKC, its predecessor) have been operated under successive licenses since June, 1925.

WSKC was purchased by the applicant in August, 1928. At this time equipment was installed and the call letters of the station changed to WBCM. The station now represents an investment of approximately $75,000. The approximate operating and maintenance cost is $72,000 a year.

WBCM employs a modern transmitter which is located on Tuscola Road about one-half mile outside the city limits of Bay City. The main studio is located in the Wenonah Hotel and is equipped with standard studio equipment.

An operating personnel of eight persons is maintained. Programs average 77 hours of Columbia chain programs and 28 hours of local programs, or a total of 105 hours a week.

355 Immediately following the general reallocation of November 11, 1928, and until about January, 1930, the present frequency assignment was considered quite satisfactory. The nearest stations then assigned to the 1410 kc. frequency were the following:

	Location.	Power.	Geographical separation.	
WHBL	Sheboygan, Wisconsin	500 watts	180 miles	Sharing time
KFLV	Rockford, Illinois	" "	260 miles	
WDGY	Minneapolis, Minn	" "	475 miles	Sharing time
WHDI	" "	" "	" "	
WDEL	Wilmington, Delaware	500 watts	520 miles	
KGRS	Amarillo, Texas	1000 "	1130 "	Sharing time
WDAC	" "	1000 "	1130 "	

Subsequently the following stations have been assigned to the same frequency:

WMAF	Boston, Mass	500 watts	660 miles	Sharing time
WSSH	" "	" "	" "	
WLEX	" "	" "	" "	
WHIS	Bluefield, West Virginia	250 "	480 miles	Sharing time
WRBX	Roanoke, Virginia	" "	510 "	
WSFA	Montgomery, Alabama	500 "	820 "	Sharing time
WODX	Mobile, Alabama	500 "	960 "	

and WDGY, WHDI and WDEL were assigned to other frequencies.

The service area of WBCM in 1929, as estimated from a study of fan mail and listening tests by an engineer of the station was approximately 85 miles in radius. The present service area is estimated to be considerably less the limiting factor being severe heterodyne interference. Failure of the station to deliver a dependable service in Saginaw, Michigan, eleven miles distant, is a handicap to the station since a large part of its business has been obtained from that city.

Observations made over a period of six days at seven different points on the outer limits of the estimated 1929 service area show that as early as 4 o'clock p. m., a heterodyne attributed to WMBC, Detroit, causes serious interference on the 1410 kc. frequency. From six until midnight, the heterodyne interference is such that programs are not audible and the particular station causing it, cannot be identified. On the 940 kc. frequency, no station may be heard until 7:30 to 8:00 o'clock.

A Western Electric 4-D receiver, modified so as to make it possible to use the second detector as a local oscillator, was used in detecting the carrier waves and a commercial
1931 Philco broadcast receiver was used for the pur-
356 pose of determining whether or not any of the sta-
tions assigned to the frequencies involved, delivered a signal of sufficient strength to be heard on an ordinary receiver. One signal was identified as WFIW and another, once during the seven nights, as WDAY. While the call letters of WFIW were heard frequently on the Western Electric superheterodyne receiver, they could not be heard on the Philco set. Also, a 50 cycle heterodyne audible on the Western Electric when two carriers were present could not be heard on the Philco. WCSH, Portland, Maine, could not be heard at any time and the call letters of WDAY, Fargo, North Dakota, were only heard on one occasion.

WSFA and WODX, Alabama stations, are heard on occasions in Bay City with loud speaker volume. These stations and WRBX, Roanoke, Virginia, are known to be sources of interference in WBCM's service. The nearest stations assigned to the same frequency, namely, WHBL, Sheboygan, Wisconsin, and KFLV, Rockford, Illinois, have not been identified as sources of interference.

WFIW, Hopkinsville, Kentucky, 515 miles southwest of Bay City, is assigned to the 940 kc. frequency and operates with a power of 1000 watts. A better signal is delivered in a north and south direction than in other directions. On the occasion of a blizzard in North Dakota in November, 1930, it was found necessary for WFIW to sign off in order to make it possible for WDAY, the Fargo, North Dakota station assigned to the 940 kc. frequency, to handle communications while wire communications were disrupted. Similarly, stations located in the Great Lakes region are heard with relatively high volume in a southern direction. WBCM is heard frequently in Hopkinsville and in Nashville, Tennessee. The simultaneous operation of WBCM and WFIW during night hours on 940 kilocycles, would be expected to result in serious heterodyne interference limiting the service area of both stations.

Station WFIW is owned and operated by WFIW, Inc., a corporation owned by stockholders of the Acme Mills. It operates 12 hours a day and serves a population scattered over a relatively large area. Programs feature plays, orchestras, farm talks, church services, two hours of phonograph records a day, a psychologist who answers questions and sells books, and various sponsored programs.

WCSH, Portland, Maine, is licensed to operate on the 940 kc. frequency with a power of 1 kw. The geographical separation is 680 miles. Practically every station of 500 watts and over, located in the general area in which Bay City is situated, delivers a carrier wave in Maine. Interference caused by WTMJ, Milwaukee, is observed in the service of WLBZ, Bangor, Maine; WNAC is limited by interference caused by WSBT, South Bend, Indiana; and WLEX, Boston, Mass., a station assigned to the 1410 kc. frequency, is badly heterodyned, apparently by WBCM.

The area in which WCSH delivers a 500 microvolt per meter or greater field intensity as determined by 872 field strength measurements and observations made over a period of three seasons, is between thirty and forty miles in radius. The population within this area numbers 281,708. Also, there are many listeners in the interior of the state not in position to receive a signal of the field strength generally considered necessary for good reception who find a field intensity much lower than 500 microvolts per meter acceptable.

357 The population within the area circumscribed by the 2,000 microvolt per meter limit numbers 85,000. The service of WCSH would be limited to this population

by heterodyne interference if WBCM be permitted to operate on the 940 kc frequency.

Station WCSH was established in 1925. It is owned and operated by the Congress Square Hotel Company, which has an investment of approximately $180,000 in the equipment of the station. In May, 1930, a new type 1005-B RCA transmitter was installed at a cost of about $120,000. Antenna towers are Milliken design, 300 feet high, spaced 600 feet apart.

Twelve employees, exclusive of artists, are employed in the operation of WCSH. Programs broadcast include chain programs distributed by the National Broadcast Company and such local features as organ recitals, religious services, educational lectures and program material furnished by the Maine Publicity Bureau and other similar organizations.

The actual geographical separation between WBCM and the stations assigned to the 940 kc frequency is much less in each instance than the separation of 1050 miles considered necessary under average conditions to prevent interference in the good service areas of the stations involved. Also, the geographical separation between WBCM and WWJ, Detroit, is much less than the 150-mile separation required under average conditions to prevent cross-talk interference where the separation is 20 kc.

The Exceptions.

The exceptions to the report of the Examiner raise no substantial questions not necessarily involved in a consideration of all facts presented in this record.

Grounds for Decision.

On the record in this case, the Commission is of the opinion and so finds:

1. If this application were granted, objectionable interference would result from the simultaneous operation of the applicant station as proposed and stations now operating on the requested frequency.

2. If this application were granted objectionable interference would result from the simultaneous operation of the applicant station as proposed and a station now operating upon a frequency 20 kc removed from that requested.

3. While it appears that the present service area of applicant station is somewhat affected by interference operation as requested would not result in any material improvement in service area.

4. The stations whose service area would be affected if this application were granted are located in sections of the country where their value to the public is largely dependent upon their ability to cover a large area and so reach a scattered rural population.

358 5. Under the provision of General Order No. 40 of the Commission, the frequency of 940 kc is available for allocation to not less than two, nor more than three, zones except that it may be allocated to four or five zones where practicable and where no interference will be caused. Since interference will be caused by the requested assignment, the terms of this General Order would be violated, if this application be granted.

6. Public interest, convenience and/or necessity would not be served by the granting of this application.

Order.

On consideration of the evidence in this case, of the Examiner's report, and of the exceptions filed thereto, it is accordingly ordered:

(1) That the request of James E. Davidson (WBCM), for oral argument before the Commission, be, and the same is hereby, denied;

(2) That the exceptions filed by James E. Davidson (WBCM), to the report of the Examiner, be, and the same are hereby, overruled; and

(3) That the application of James E. Davidson (WBCM), for modification of station license, be, and the same is hereby, denied.

Filed October 2, 1931.

I hereby certify that the foregoing is a full, true and correct copy of the Statement of facts, grounds for Decision, and Order of the Federal Radio Commission, in Docket No. 1152.

[Seal Federal Radio Commission.]

JAMES W. BALDWIN,
Secretary,
By GEORGE I. SMITH.

359 In the Court of Appeals of the District of Columbia.

No. 5528.

JAMES E. DAVIDSON (Station WBCM), Appellant,

v.

FEDERAL RADIO COMMISSION.

Certificate of James W. Baldwin, Secretary of the Federal Radio Commission.

I, James W. Baldwin, Secretary of the Federal Radio Commission, do hereby certify that the attached are originals or true and correct copies of all papers and evidence presented to the Federal Radio Commission upon the matter involved in the above-entitled cause, and also attached hereto is a true and correct copy of the Statement of Facts, Grounds for Decision, and Order of the Commission in the matter of the application of James E. Davidson (Station WBCM) for modification of station license as amended.

Witness my hand and the seal of the Federal Radio Commission this fifth day of November, 1931.

[Seal Federal Radio Commission.]

JAMES W. BALDWIN,
Secretary Federal Radio Commission.

360 [Endorsed:] Court of Appeals, District of Columbia. Filed Nov. 5, 1931. Henry W. Hodges, Clerk.

Endorsed on cover: Federal Radio Commission. No. 5528. James E. Davidson (WBCM), appellant, vs. The Federal Radio Commission; Congress Square Hotel Company, intervener. Court of Appeals, District of Columbia. Filed Oct. 21, 1931. Henry W. Hodges, Clerk.

COURT OF APPEALS
DISTRICT OF COLUMBIA
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IN THE

COURT OF APPEALS,

DISTRICT OF COLUMBIA

No. 5528

JAMES E. DAVIDSON (WBCM),
Appellant,

vs.

FEDERAL RADIO COMMISSION,
Appellee.

BRIEF IN BEHALF OF APPELLANT

CHARLES H. LEFEVRE,
HOWARD S. LEROY,
Attorneys for Appellant.

W. F. ROBERTS CO. WASHINGTON D. C

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IN THE

COURT OF APPEALS,

DISTRICT OF COLUMBIA

No. 5528

JAMES E. DAVIDSON (WBCM)
Appellant

vs.

FEDERAL RADIO COMMISSION
Appellee

BRIEF IN BEHALF OF APPELLANT

STATEMENT OF THE CASE

This is an appeal under Section 16 of the Radio Act of 1927 as amended. It is taken from an Order of the Federal Radio Commission denying the application of James E. Davidson for modification of station license to permit operation of his radio broadcasting station known by the call-letters WBCM, at Bay City, Michigan, on the frequency of 940 kilocycles with a power output of 500 Watts, unlimited time, for the purpose of restoring to him the service area, originally allotted to him by the Commission on his present frequency of 1410 kilocycles, now largely lost by subsequent allocations of other stations to the 1410 kilocycle frequency by the Commission without notice and hearing to appellant.

A. STATION WBCM

Ownership of Station. Appellant, James E. Davidson, of Bay City, Michigan, owns and operates WBCM, a radio broadcasting station which was unquestionably the leading station in Central Michigan.

The financial ability of appellant is unquestioned as is also the excellent character of its programs and of its technical equipment and operation.

History of Station WBCM. Station WBCM was purchased by the Appellant in August, 1928. It had been previously owned and operated by the World's Star Knitting Company and known as Station WSKC (R. 26). Under successive licenses it has been operated since 1925. As soon as appellant took control of the station application was made to the Commission for a construction permit to erect and equip a new station. The application was granted in the Summer of 1928 and the new station went on the air December 8, 1928 (R. 26). The station has on all occasions carefully complied with the letter and intent of the rules and regulations of the Federal Radio Commission. It has always kept in advance of the technical requirements of the Commission by embodying the latest engineering equipment. Appellant has spared no expense to furnish its listeners with varied programs of the highest quality.

Investment of Appellant in Station WBCM. Station WBCM represents an original expenditure of approximately $75,000 for actual tangible property representing land, buildings, and equipment. This includes no allowance of any value for station license or good will (R. 26). The operating costs for the year 1930 approximated $72,000 exclusive of any item for depreciation of equipment. The cost of maintenance is allocated to such items as salaries, $16,905.95, general expenses, $42,532.42, new equipment, $11,356.80, insurance, $242.02, and freight $60.75 (R. 26).

Equipment and Personnel. The present transmitter is a standard Western Electric D-88137 with associated apparatus located on Tuscola Road about one-half mile outside the city limits of Bay City. Relying upon its original service area, in January, 1930, Appellant installed all new studio equipment, a Western Electric Crystal Oscillator and a high percentage modulation panel at a cost of approximately $12,000.00. The main studios are located in the Wenonah Hotel in Bay City and are fully equipped with the most modern Western Electric equipment obtainable (R. 26, 29).

The operating personnel of the station includes eight persons on a full time basis. This includes a general manager, program director, two commercial men, three engineers and office manager. This does not include part time personnel in connection with sponsored programs (R. 27).

Program Service. Since January, 1930, the station has been affiliated with the Columbia Broadcasting Chain. This has brought Columbia Broadcasting program service to listeners in Central and Northern Michigan for the first time. This program service is not duplicated by other stations. (R. 27.) The station has always served public interest, convenience and necessity by furnishing its listeners with the highest quality of broadcasting programs obtainable. Since February, 1930, the station has operated sixteen hours a day and six days a week, twelve hours on Sunday (R. 27). Of the approximately 105 hours per week of broadcasting, 77 hours are Columbia chain programs and 28 hours are local programs. This includes a very liberal allowance of free time to educational, religious and philanthropic programs (R. 28). The station programs for the week of April 19, 1930, are typical of the program service rendered by this station (R. 106-114).

Service Area of Station WBCM. Prior to the virtual destruction of its service area by actions of the Federal Radio Commission as hereinafter set forth in this brief, WBCM was delivering satisfactory reception to Central and Northern Michigan. For approximately a year following the reallocation of November 11, 1928, the original service area of the station included all or part of each of twenty-eight counties in Central and Northern Michigan with a population of 666,000 (R. 27, 28). That WBCM was actually rendering satisfactory service over this area from the time of its allocation to the 1410 kilocycle frequency following the general reallocation of November 11, 1928, until about January, 1930, is determined by a large volume of mail and listening tests (R. 28, 270). This area extended about 85 miles from the transmitter at Bay City (Applicant's Exhibits No. 2, p. 114a—Map of State of Michigan showing present and former service area of Station WBCM).

During the period of a little more than a year when WBCM enjoyed its original satisfactory service area, the following seven stations were allocated to the 1410 kc.

channel in addition to WBCM without in any way restricting the service area (R. 27, 270):

WHBL, Sheboygan, Wis.	500 Watts	180 miles
KFLV, Rockford, Ill.	500 "	260 "
WDGY, Minneapolis, Minn.	500 "	475 "
WHDI, Minneapolis, Minn.	500 "	475 "
WDEL, Wilmington, Dela.	500 "	520 "
KGRS, Amarillo, Texas	1000 "	1130 "
WDAC, Amarillo, Texas	1000 "	1130 "

Following January, 1930, the following seven additional stations were assigned to the 1410 kilocycle channel:

WMAF, Boston, Mass.	500 Watts	660 miles
WSSH, Boston, Mass.	500 "	660 "
WLEX, Boston, Mass.	500 "	660 "
WHIS, Bluefield, W. Va.	250 "	480 "
WRBX, Roanoke, Va.	500 "	510 "
WSFA, Montgomery, Ala.	500 "	820 "
WODX, Mobile, Ala.	500 "	960 "

(R. 32, 270)

Following these seven additional assignments to the 1410 kc. channel, the service area of WBCM was pinched in by heterodyne interference from a radius of approximately 85 miles to a radius of approximately 9 miles, with a loss in listeners from 666,000 to 55,000 or 90% (R. 27, 29, 271).

Some of this heterodyne interference was identified as coming from Stations WSFA, WODX and WRBX (R. 52). Some of the interference, very damaging in the evening hours, was coming from Station WMBC of Detroit. This station on the 1420 kc. channel had received an increase in power from 100 to 250 watts until local sunset on December 5, 1929 (R. 33).

The destructive character and complicated pattern of the interference is shown by applicant's Exhibit Five (R. 123-132) survey of Interference on 1410 kilocycles.

The effect of this almost complete loss of service area by the crowding of additional facilities on to the 1410 channel has been to seriously threaten the appellant's investment and to deprive many listeners of service in Central and Northern Michigan. Since December, 1929, a large volume of mail has been received continuously from listeners in the original service area complaining as to interference and inability to receive the station's programs during the late afternoon and evening hours (R. 33). The original service area is not consistently served by any other station (R. 34). The blanketing of the station's evening service prevents its serving these sections of the State. The extent to which the appellant's large investment has been threatened is manifest by the fact that although the station formerly enjoyed a service area with a radius of approximately 85 miles, now its programs are not satisfactorily received in Saginaw, a city with a population of 85,000 some eleven miles distant, from which the station derives the bulk of its income from the sale of commercial time (R. 34).

The appellant was then confronted with the necessity of acting to protect the public it had been serving and its own investment. After careful survey and consideration, the most feasible and appropriate action seemed to be to apply for modification of license by assignment to the 940 kc. channel. There is a greater separation between Bay City and the other existing stations on the 940 kilocycle channel than on any other regional channel. Hence this channel offered the best prospect of re-establishing the original service area of the station without substantial interference to other stations existing on that channel (R. 34).

B. PROCEEDINGS BEFORE THE FEDERAL RADIO COMMISSION

On February 20, 1930, the appellant's application for modification of station license was received by the Radio Division of the Department of Commerce (R. 13-15, inclusive). This application requested a change in frequency from the 1410 kilocycle frequency to the 920 kilocycle frequency, a change in power from 500 watts to 1000 watts. It was filed for consideration by the Commission only if Station WWJ, of Detroit, then assigned to the 920 kilocycle channel, should be assigned to the 1020 kilocycle channel, as a consequence of the high power hearings then pending.

On March 7, 1931, following an adverse report by the Chief Examiner on the application of WWJ for a cleared channel, the appellant filed with the Commission his motion to amend his application (R. 15-16, inclusive). The application was amended to request assignment to the 940 kilocycle channel, and the power requested was reduced from 1000 watts to 500 watts.

On March 27, 1931, the Secretary of the Commission mailed out notice of hearing on appellant's application, fixing the time and place of the hearing as April 23, 1931, at the offices of the Commission, Washington, D. C. (R. 16-18, inclusive).

On April 14, 1931, the appellant filed with the Commission his appearance and statement (R. 19-21, inclusive).

On April 24, 1931, a hearing (Docket No. 1152) was held before Examiner R. H. Hyde (R. 22-106, inclusive).

On July 15, 1931, Examiner Hyde submitted his report (Examiner's Report No. 224) recommending that the application be denied (R. 269-275, inclusive).

On July 31, 1931, the appellant filed his exceptions to the Examiner's Report No. 224, accompanied by a request upon the Commission for oral argument of the exceptions (R. 275-282, inclusive).

On October 2, 1931, the Commission filed its decision and order, denying the request for oral argument of the exceptions before the Commission, overruling the exceptions, and denying the appellant's application for modification of station license (R. 282-287, inclusive).

On October 21, 1931, the appellant filed the notice of Appeal herein, together with the reasons for Appeal (R. 1-7, inclusive).

On October 31, 1931, the Congress Square Hotel Company, licensee of Station WCSH, of Portland, Maine, operating on 940 kilocycles, filed with the Court Notice of Intention to Intervene, together with Verified Statement showing the nature of its Interest (R. 7-9, inclusive).

Points Relied On. The points relied on by appellant are set forth in the statement of reasons for Appeal appended to Appellant's notice of appeal (R. 1-5). These reasons may be restated as follows:

1. Station WBCM has been subjected to a reduction of most of its normal and established service area by action of the Commission without notice and without hearing to appellant.

2. The Commission erred as a matter of law in shifting seven additional stations to the 1410 kilocycle frequency without notice to appellant and without an opportunity for it to be heard.
3. Appellant is clearly entitled to some form of relief from the Commission which will measurably re-establish it in the position occupied prior to the additional allocations.

ARGUMENT

I.

Station WBCM has been subjected to a reduction of most of its normal and established service area by action of the Commission without notice and without hearing to appellant.

This appeal involves the correctness of action by the Federal Radio Commission. Under the general reallocation of November 11, 1928, the Commission, pursuant to its statutory authority, licensed Station WBCM at Bay City, Michigan, to broadcast on the 1410 kilocycle frequency with 500 watts power unlimited time.

The appellant, acting under this authority, in good faith and in conformity with all the regulations of the Commission, furnished to the public in Central and Northern Michigan a high grade broadcasting service (R. 27, 28). On December 8, 1928, in further reliance on the authority granted by the Commission and in accordance therewith, the appellant, at heavy cost, completed installation of improved broadcasting equipment and, under its operation, furnished a more effective service to the population in its service area. Following the general reallocation of November 11, 1928, and until about January, 1930, the present frequency assignment was considered quite satisfactory (R. 27, 28, 270). Seven other stations had also been assigned to the 1410 kilocycle frequency (R. 270). Appellant's station WBCM for a period of more than a year enjoyed a normal and established service area with a radius of some 85 miles and a population of 666,000 (R. 27, 271).

In January, 1930, the appellant, further relying upon this established service area, installed additional new and improved equipment at an approximate cost of $12,000. At the same time appellant affiliated with the Columbia Broadcasting Chain and increased its hours of operation to sixteen hours a day at a cost of approximately $35,000 including line charges and special programs (R. 29). This enabled the appellant to better serve the public interest, convenience and necessity by furnishing its listeners with the highest obtainable quality of broadcasting programs averaging 105 hours a week, of which about 77 hours are Columbia Chain programs and 28 hours of local programs, including a very liberal allowance of free time to educational, religious, and philanthropic programs (R. 28).

Subsequently, and after WBCM had been in the enjoyment of its normal and established service area, the Commission assigned seven additional stations to the 1410 frequency (R. 32, 33, 263, 270). On December 5, 1929, the Commission also granted an increase of power from 100 to 250 watts until local sunset to Station WMBC, Detroit, 90 miles distant from Bay City (R. 33). The resulting heterodyne interference has reduced the normal and established service area to a radius of nine miles with a population loss of 90% as shown by a large volume of mail and tests conducted by appellant's chief engineer (R. 29, 33, 34, 114a).

The appellant was never cited as a respondent in any hearings set in connection with the allocation of these added facilities and he never received any notice in advance of these assignments (R. 33).

This Court has determined that radio broadcasting is subject to regulation as a form of interstate commerce (*Technical Radio Laboratory* v. *Federal Radio Commission,* 36 Fed. (2d) 111; *City of New York* v. *Federal Radio Commission,* 36 Fed. (2d) 115).

This Court has also declared that the purpose of this regulation is to prevent chaos and insure satisfactory service (*Journal Co.* v. *Federal Radio Commission,* 48 Fed. (2d) 461).

The methods of the licensing authority in making this purpose effective are subject to certain established limitations with respect to notice and hearing.

Any regulatory action by the licensing authority affecting the normal and established service area of a broadcasting station is subject to the requirement of notice and hearing.

This principle was established in the case of *Saltzman* v. *Stromberg-Carlson Telephone Manufacturing Co.,* 46 Fed. (2d) 612. In that case the Commission ordered a change of appellant's broadcasting frequency without prior notice or opportunity for prior hearing. The effect of that assignment to a new frequency would have been a redefinition of the station's service area based on new and variable factors. In the instant case a redefinition of appellant's service area—involving a demolition of

90% (R. 27, 28, 29, 114a, 271)—was made effective by the allocation of seven additional stations to the 1410 kilocycle frequency. This Court has recognized that a broadcasting station's service area may be substantially diminished by a shifting of other stations on the same frequency (*Journal Co.* v. *Federal Radio Commission,* 48 Fed. (2d) 461). These additional allocations were made by the Commission without prior notice to the appellant and without opportunity for prior hearing (R. 33). Although the testimony on this point is clear and uncontradicted, the Examiner in his Report (R. 269-275) fails to make any finding with respect to it. The importance of this point is clear from the following excerpt from the decision of this Court in the *Journal Case,* 48 Fed. (2d) 461:

> "As already observed, appellant's station had already suffered similar harm by the action of the Commission with respect to such other stations on the same frequency; moreover, this action was taken without notice to appellant."

II.

The Commission erred as a matter of law in shifting seven additional stations to the 1410 *kilocyle frequency and in increasing the power of a nearby station on an adjacent frequency without prior notice to appellant and without prior opportunity to be heard.*

The purpose of the regulatory power conferred by the Radio Act of 1927 (44 Stat. 1169-47 U. S. C. A. Section 96) upon the Commission as declared by this Court is "to prevent chaos and insure satisfactory service." *Journal Co.* v. *Commission,* 48 F (2d) 461.

The limiting physical factor is the phenomena of interference. Interference, if uncontrolled, would destroy both public and private interests. The Commission functions as an administrative agency in maintaining a balance between public and private interests. The standard for the guidance of Commission action for the protection of the public is the statutory one of "public interest, convenience and necessity." The standards for the guidance of Commission action for the protection of private interests comprise the customary safeguards of adequate notice and hearing with respect to administrative changes affecting the owners' broadcasting service facilities.

In the Journal case—48 Fed. (2d) 461— this Court declared:

> "The installation and maintenance of broadcasting stations involve a very considerable expense. Where a broadcasting station has been constructed and maintained in good faith, it is in the interests of the public and common justice to the owner of the station that its status should not be injuriously affected except for compelling reasons. * * *
>
> "No station that has been operated in good faith should be subjected to a change of frequency or power or to a reduction of its normal and established service area except for compelling reasons."

What are compelling reasons?

It is submitted that compelling reasons embrace the exigencies of public interest, convenience and necessity only as clearly evidenced after due notice and hearing to the station owner.

In the instant case the record is clear that the appellant's station represents an original expenditure of $75,000 for actual tangible property representing land, buildings, and equipment, exclusive of any value for station license or good will, and that the gross operating costs of the station approximate $72,000 a year, exclusive of depreciation of equipment (R. 26). The appellant has maintained and operated the station in good faith, in strict conformity with Commission regulations and sparing no expense as to equipment or program to bring to its listeners the best available broadcasting service (R. 26, 28, 29).

Without prior notice and without hearing to the appellant the Commission deprived appellant of the largest part of its normal and established service area by:

1. Shifting seven additional stations to the 1410 kilocycle frequency (R. 32, 270).
2. Increasing the power of the nearby station WMBC on the adjacent frequency of 1420 kilocycles from 100 watts to 250 watts local sunset (R. 33).

The effect of these administrative changes was to produce a heterodyne interference so terrific that appellant's programs are not audible and so complex that the stations causing it can not be identified from 6:00 P.M. until midnight (R. 123-132, 271).

It is submitted that however exigent the public service motives may have been in actuating the Commission to action depriving the appellant of its normal and established service area without notice and hearing, they did not constitute "compelling reasons" and the Commission was in error as a matter of law in so acting. *Chicago Federation of Labor* v. *Federal Radio Commission,* 41 Fed. (2d) 422; *Reading Broadcasting Co.* v. *Federal Radio Commission,* 48 Fed. (2d) 458.

III.

Appellant is clearly entitled to some form of relief from the Commission which will measurably reestablish it in the position occupied by it prior to the erroneous actions by the Commission.

The action of the Commission in shifting seven additional stations to the 1410 kilocycle frequency, and in increasing the power of a neighboring station on the adjacent frequency of 1420 kilocycles, was taken without notice to the appellant (R. 33). This action was greatly to the prejudice of the appellant in that it caused an almost complete deprivation (90%) of its normal and established service area (R. 29, 271). This deprivation of service area seriously threatens the large investment in the station by the appellant (R. 34).

This situation made imperative remedial action by the appellant. After the increase of facilities granted by the Commission the most appropriate remedy was an application for modification of broadcasting license for the purpose of restoring the station's normal and established service area. In the *Journal Case,* 48 Fed. (2d) 461, this Court directed the granting of general relief to the appellant after the Commission had denied the appellant's application for modification of license requesting specific relief. It is fair to assume therefore that an application for modification of license is a proper procedure to take for restoration of normal and established service area. It would also seem that the filing of such an application opens up the whole question of relief both specific and general. The denial by the Commission of the specific relief applied for does not bar this Court from ordering general relief based on the Commission's error of prejudicial action without notice and hearing to the appellant.

Appellant herein contends that on the basis of the Commission's erroneous and prejudicial action and his application for modification of license by way of remedy he is entitled to:

1. The specific relief requested, or
2. The general relief implicit in the nature and circumstances of the application.

1. The appellant is entitled to the specific relief requested.

The appellant in his application for modification of license requested assignment to the 940 kc. channel without change of power or time (R. 15). The purpose of this application was to re-establish the normal and established service area of the station (R. 24). The selection of the 940 kc. channel was made by the appellant after careful surveys by its own engineer as the most available channel to permit the re-establishment of the original service area of the station without substantial interference to other existing stations on the 940 kc. channel (R. 34).

The denial by the Commission of this specific relief was manifestly against the evidence presented at the hearing (R. 22-139).

The primary question at the hearing was probable interference to the 940 kc. channel stations in the event that

WBCM should be shifted to that channel in accordance with its request for specific relief.

On that question five engineering witnesses testified. Of these five engineers Mr. Carpenter, the appellant's engineer, testified in detail and at length, contending that the proposed shift would not cause substantial interference to the respondent stations (R. 25-66). His testimony was supported by actual field surveys, maps, and his own personal experience and technical familiarity with the area in question (R. 114-132).

The four remaining technical witnesses testified in opposition to the appellant (R. 66-106). Their testimony consisted of statements of opinion as experts as to probable interference if WBCM went on the 940 kc. channel. Their testimony was unsupported by field surveys or any personal familiarity with the WBCM area (R. 70, 72, 77, 80, 103). Expert testimony with respect to interference is very uncertain even when supported by field surveys. Expert testimony unsupported by surveys and without personal acquaintance with the area in question is entitled to no weight. This record affords the best example of this in the testimony with respect to the service area of Station WFIW.

Mr. Linx testifying on behalf of WFIW on cross examination conservatively estimated the night-time service area as 175 to 200 miles (R. 70).

Mr. Ring testifying on behalf of the Commission on cross-examination estimated the WFIW service area as possibly 25 to 50 miles (R. 88).

The Examiner, relying on such testimony as to probable interference, reached a conclusion manifestly against the evidence.

The attitude of interested respondent stations may be significant with respect to probable interference on the 940 frequency. The Commission notified twenty interested licensees and applicants (R. 9, 10). Of these twenty parties, only four saw fit to appear. Of these four parties one appeared by counsel only, and the remaining three appeared by counsel and offered evidence (R. 23).

Station WDAY, Fargo, North Dakota, made no appearance and offered no evidence. Manifestly against the evidence the Examiner reached conclusions with respect to WDAY.

WFIW of Hopkinsville, Kentucky, using one Kilowatt of power, twice the power allocated to WBCM, broadcasting only 12 hours a day, without a chain affiliation, furnishing a program containing so-called psychologists with direct sale of books, without any field survey as to its service area, puts on its engineer who expresses an opinion that there would be probable interference (R. 71). This same engineer's opinion as to the service area of his own station varies by 150 to 175 miles from the opinion of the Commission's engineer (R. 88).

With respect to probable interference from WCSH, it was shown by Mr. Carpenter, the appellant's engineer, by his field survey of the 940 kc. channel, that WCSH carrier was not received in Michigan (R. 37, 114-132). Mr. Foss, testifying on behalf of WCSH, stated on cross-examination that after a period of testing of several years, including 500 watt stations in the Great Lakes area, he had never picked up the appellant's station WBCM (R. 102-103).

It is submitted that the Examiner's conclusion that probable interference resulting from the proposed change would impair the service of existing stations is manifestly against the evidence.

2. The appellant is entitled to general relief from the Commission, irrespective of its decision on the specific relief requested by the appellant. In the *Journal Case,* 48 F. (2d) 461, very similar to this case, this Court decreed general relief for the Journal Company over the denial by the Commission of the specific relief requested by the Journal Company.

In the *Journal Case,* as in this, the appellant had lost a substantial part of its service area by the action of the Commission in shifting stations and increasing power without notice to appellant and an opportunity to be heard. In the *Journal Case,* as in this, the appellant sought specific relief by the filing of an application for modification of license to effect a restoration of normal and established service area. The Commission, in that case, as in this, denied the specific relief requested, on the ground that it would ruin reception of all the other stations on the frequency. This Court clearly pointed out that the denial of specific relief on the ground of probable interference did not constitute a final disposition of the appellant's claim to relief. This Court indicated that the Commission could not properly deny all relief to the appellant on the ground of increased interference when the situation calling for relief sprang from increased interference suffered by the appellant and caused by the failure of the Commission to abide by its own established principles as to interference. This Court, reluctant to direct the particular form of relief, held that the appellant was entitled to some form of relief, and directed a reversal of the Commission's decision, with a direction to the Commission to afford appellant, after notice and opportunity to be heard, such relief as would measurably re-establish the appellant in the position occupied by it prior to the acts complained of.

In the instant case counsel for the appellant cited and urged the *Journal Case* decision at the hearing herein and in the exceptions to the Examiner's Report filed herein (R. 106, 280).

The appellant contends that it is entitled on the merits to a direction for general relief, irrespective of the denial of the request for specific relief on the ground of interference.

CONCLUSION

Station WBCM was induced to make large expenditures of its capital by reason of its being given by the Federal Radio Commission a license to operate in a given locality under specified terms as to power and frequency resulting in a normal and established service area, and by reason thereof it is entitled to protection of its investment and of its privilege to so operate. If, therefore, its capital investment has in fact been reduced in value and its field of operation has been decreased by action of the Federal Radio Commission, and without due process, or without just compensation, it is entitled to some relief, either to a new assignment of frequency that will preserve its field of operation or to a revocation of the privileges given to others at the expense and loss of Station WBCM. Relief as given by this Honorable Court in the *Journal Case* is invoked in the instant case, and, upon grounds almost identical to those in the *Journal Case.*

The appellant prays that this Court may uphold its contentions:

1. That it has been deprived of most of its normal and established service area without prior notice and without prior hearing,
2. That the Commission erred as a matter of law in shifting new stations to appellant's frequency and in increasing power on the adjacent frequency without notice and hearing,
3. That the appellant is clearly entitled to some form of relief, either specific or general, which will measurably re-establish it in the position occupied by it prior to the allocation of additional facilities,

and direct a reversal of the Commission's decision with a direction for specific or general relief to be determined by the Commission after due notice and hearing to the appellant.

Respectfully submitted,

CHARLES H. LEFEVRE,
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COURT OF APPEALS
DISTRICT OF COLUMBIA
FILED

MAR 26 1932

Henry W. Hodges

CLERK

No. 5528

In the Court of Appeals of the District of Columbia

James E. Davidson (Station WBCM), appellant
v.
Federal Radio Commission

BRIEF ON BEHALF OF THE FEDERAL RADIO COMMISSION

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In the Court of Appeals of the District of Columbia

No. 5528

James E. Davidson (Station WBCM), appellant
v.
Federal Radio Commission

BRIEF ON BEHALF OF THE FEDERAL RADIO COMMISSION

I. STATEMENT

This is an appeal from an order of the Federal Radio Commission dated October 2, 1931, denying an application filed by appellant, James E. Davidson, operating Station WBCM, at Bay City, Michigan, for modification of license requesting a change in frequency from 1,410 kilocycles, where it is now operating, and has been since the general reallocation of broadcast stations of the United States, effected by the Commission November 11, 1928, to the frequency 940 kilocycles. (R. 13–16, inclusive.) The frequencies 1,410 kilocycles and 940 kilocycles are in the class designated by the Commission as "regional" frequencies. This station is licensed for the use of 500 watts power with unlimited hours of operation. No change in these assignments is requested.

The application was originally filed by Appellant on February 15, 1930, requesting 920 kilocycles with 1 kilowatt power (R. 13 and 14), and on March 7, 1930, was amended by the applicant so as to request the frequency 940 kilocycles and 500 watts power. (R. 15 and 16.)

At the date of the filing of this amendment there were (and still are) assigned to, and operating on, the frequency of 940 kilocycles the following stations, the distance of each from appellant's station, WBCM, at Bay City, Michigan, being:

Station	Location	Power	Distance from Bay City
		Kilowatt	*Miles*
WFIW	Hopkinsville, Kentucky	1	515
WSCH	Portland, Maine	1	680
WDAY	Fargo, North Dakota	1	690

(R. 78, 79, and 241.)

There was (and still is) also station WWJ on the frequency of 920 kilocycles using one kilowatt power just 20 kilocycles removed from the frequency requested by appellant's application at Detroit, Michigan, 95 miles away from Bay City. (R. 79 and 240.)

All the foregoing stations are at distances from appellant's station considerably less than the geographical separation generally regarded by engineers as necessary to avoid objectionable interference (R. 79), and it was at once apparent that the granting of the application might result in interference on the frequency requested and adjacent frequencies. The Commission being unable to determine from an examination of appellant's application that the granting thereof would serve public interest, convenience, and necessity, designated the same for hearing, of which due and timely notice was given appellant. (R. 16, 17, and 18.)

Thereafter, on April 14, 1930, appellant filed his Appearance and Statement, acknowledging receipt of the Notice of designation of his application for hearing and indicating his desire to be heard thereon. (R. 19–21, inclusive.) Here for the first time appellant stated that the service area of his station had been impaired by the Commission's several grants over a period of more than two years to other stations for the use of the frequency of 1,410 kilocycles. (R. 19, 20.) No appeal has ever been taken by appellant from such acts of the Commission, or from its action renewing any of the licenses of such stations assigned to 1,410 kilocycles, and no protest was made to the Commission or other appropriate proceeding taken for relief with reference to that frequency and the stations assigned thereto. (R. 44.)

In accordance with the notice given appellant, the matter of his application for modification of license came on to be heard April 24, 1931, before an examiner appointed by the Commission. (R. 23.)

Appellant appeared and was represented by counsel, as did respondent stations WHA, Madison, Wisconsin, WCSH, Portland, Maine, WWJ, Detroit, Michigan, and WFIW, Hopkinsville, Kentucky. (R. 23–106, inclusive.)

Thereafter, on July 15, 1931, the examiner filed his report in said matter recommending that the application of James E. Davidson, appellant herein, for modification of license be denied. (R. 269–275, inclusive.)

On July 31, 1931, appellant filed his exceptions to the examiner's report. (R. 276–282, inclusive.)

On October 2, 1931, the Commission filed its Statement of Facts, Grounds for Decision, and Order denying appellant's application for modification of license (R. 282–287, inclusive) in which the following findings were made:

1. If this application were granted, objectionable interference would result from the simultaneous operation of the applicant station as proposed and stations now operating on the requested frequency.

2. If this application were granted, objectionable interference would result from the simultaneous operation of the applicant station as proposed and a station now operating upon a frequency of 20 kilocycles removed from that requested.

3. While it appears that the present service area of applicant station is somewhat affected by interference, operation as requested would not result in any material improvement in service area.

4. The stations whose service area would be affected if this application were granted are located in sections of the country where their value to the public is largely dependent upon their ability to cover a large area and so reach a scattered rural population.

5. Under the provisions of General Order No. 40 of the Commission, the frequency of 940 kilocycles is available for allocation to not less than two, nor more than three, zones except that it may be allocated to four or five zones where practicable and where no interference will be caused. Since interference will be caused by the requested assignment, the terms of this General Order would be violated if this application be granted.

6. Public interest, convenience, and/or necessity would not be served by the granting of this application.

II. ARGUMENT

Although this appeal arises from the denial of a specific application for modification of station license requesting a change in frequency from 1,410 kilocycles to 940 kilocycles, and nothing more was asked of the Commission in said application (R. 13–16, inclusive), appellant here contends that certain assignments made by the Commission to his frequency since January, 1930, without notice to him or hearing, but to which he has heretofore made no objection or from which he has taken no appeal or other appropriate action, have resulted in cutting down the service area he claims his station theretofore enjoyed. Appellant now asks this court for some relief "which will measurably reestablish it in the position occupied prior to the additional allocations." (R. 5.)

It is our contention that neither the action of the Commission in assigning other stations to the frequency assigned to appellant nor its failure to accord him "general relief" are now before this Court (*Technical Radio Laboratory* v. *Federal Radio Commission*, 59 App. D. C. 125; 36 F. (2d) 111), the only question being whether the Commission's denial of appellant's application is sustained by the evidence.

Accordingly, we propose to show:

1. The assignments to the 1,410-kilocycle frequency made over a period of more than two years and now for the first time complained of by appellant do not concern the application, denial of which is the basis for this appeal.

A. The service area of Station WBCM prior to January, 1930, could not have been 85 miles in radius, as appellant contends.

B. The stations assigned to the frequency of 1,410 kilocycles subsequent to the reallocation of November, 1928, were at distances from appellant's station three and four times greater than those already on the channel where it was not necessarily expected that interference might result to any other station on the channel.

C. The assignments to the 1,410-kilocycle frequency now complained of by appellant were made over a period of more than two years without objection or protest by him.

2. The Merits of this Controversy.

A. The findings and Order of the Commission are amply supported by the evidence.

B. This Court should sustain the Commission's findings of fact, and its Order should be affirmed unless shown to be manifestly against the record.

1. The assignments to the 1,410-kilocycle frequency made over a period of more than two years and now for the first time complained of by appellant do not concern the application, denial of which is the basis for this appeal

A. The service area of Station WBCM prior to January, 1930, could not have been 85 miles in radius, as appellant contends

In 1928, when the Commission made its general reallocation of broadcast stations, there were a grossly excessive number of stations in existence, many of which were geographically much closer together than they should be for good reception, and it was not possible for the Commission to remedy the matter without a wholesale deletion of stations whose merits it was not then in position to determine. Some of the assignments made at that time, although at lesser separations than good engineering practice would dictate, were necessary in the interest of the common cause of broadcasting, and were more or less experimental. Thus it was that appellant was assigned to the frequency it now uses, viz, 1,410 kilocycles. The nearest stations then assigned to this frequency were:

Location	Power	Geographical separation	
	Watts		
WHBL, Sheboygan, Wisconsin	500	180 miles	Sharing time.
KFLV, Rockford, Illinois	500	260 miles	
WDGY, Minneapolis, Minnesota	500	475 miles	Sharing time.
WHDI, " "		475 miles	
WDEL, Wilmington, Delaware	500	520 miles.	
KGRS, Amarillo, Texas	1,000	1,130 miles	Sharing time.
WDAC, Amarillo, Texas	1,000	1,130 miles	

(R. 27.)

Although two stations, WHBL and KFLV (between them licensed for unlimited hours of operation), were at distances 180 and 260 miles, respectively (R. 86), which is less than the recommended separation for stations of this power, WBCM operated on the frequency of 1,410 kilocycles with these stations without complaint, claiming a service area of 85 miles (R. 28, 29, and 114–a). The witness, Ralph Carpenter, who is appellant's engineer, testified that "since November 11, 1928, the station has been broadcasting on the 1,410-kilocycle channel. At that time seven other stations were operating on the same channel without restricting in any way the service area," naming the seven stations hereinbefore set forth. (R. 27.)

It also appears from the testimony of this witness that the service area claimed by station WBCM prior to January, 1930 (as shown from a map (R. 29 and 114–a), prepared by him a few days before the hearing, April 24, 1931, R. 50), was based "about 50 per cent upon mail received and about 50 per cent upon observations that we made" with a Western Electric receiver (R. 31 and 51), but that no field intensity tests were made at any time to determine what signal the station was laying down (R. 51).

The "observations" consisted of listening tests made prior to January, 1930. (R. 50.) When asked how many listening tests were made, the witness Carpenter replied, "As I say, they were informal listening tests and no actual record has been kept of them. I will say about a half a dozen." (R. 31.) Referring to the apparatus used to make these listening tests, the witness was asked whether it was calibrated in any way to determine the strength of the field that he measured, and he replied that it was not. (R. 40.)

There is nothing in the record to show that the stations on this frequency (at closer geographical distances than is generally recommended by engineers of good standing, and which are therefore interference possibilities) were on the air at the times when the listening tests were made, and on cross-examination the witness Carpenter admitted the possibility of listeners getting Station WBCM when the Sheboygan and Rockford stations were off the air. (R. 58.) It is clear, therefore, that this type of evidence is unreliable to establish the service area of a station. It is common knowledge that to establish, reliably, the service area of a station, field intensity tests should be taken with properly calibrated apparatus and observations made night after night under all possible conditions. It is respectfully submitted that little can be determined from six listening tests made with uncalibrated apparatus, over a period of one week at one season of the year (R. 87),[1] and that "fan mail" is especially unreliable.

Station WBCM is a 500-watt station. (R. 13.) The record discloses that the service area of a 1,000-watt station is from 25 to 50 miles. (R. 88.) These figures are, of course, based upon average conditions and factors where the mileage separation of surrounding stations is approximately that recommended. The normal service area of a 500-watt station would necessarily be substantially less. Mr. Andrew Ring, a Commission Engineer, testified that in the case at bar, with two 500-watt stations at distances 180 and 260 miles, respectively, from appellant's station, it is not possible for station WBCM to have had a service area such as that claimed by appellant. (R. 86.)

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[1] (R. 87.) Q. Is it a fair test in searching for probable heterodyne on a frequency to test it for six days during six successive nights during the month of April?

A. (Mr. Ring, Commission Engineer.) Under average conditions six days during the month of April, in my opinion, are not sufficient to accurately predict what might happen during the greater portion of the year.

B. The stations assigned to the frequency of 1,410 kilocycles subsequent to the reallocation November, 1928, were at distances three and four times greater than those already on the channel where it was not necessarily expected that interference might result to any other station on the channel

After the general reallocation of broadcast stations in November, 1928, stations WDGY, WHDI, and WDEL, then assigned to 1,410 kilocycles, were assigned to other frequencies, and the following stations were assigned to 1,410 kilocycles:

		Watts		
WMAF	Boston, Massachusetts	500	660 miles	sharing time.
WSSH	do	500	660 miles	
WLEX	do	500	660 miles	
WHIS	Bluefield, West Virginia	250	480 miles	sharing time.
WRBX	Roanoke, Virginia	250	500 miles	
WSFA	Montgomery, Alabama	500	820 miles	sharing time.
WODX	Mobile, Alabama	500	960 miles	

(R. 283.)

It will be noticed that the seven stations thus assigned to the frequency of 1,410 kilocycles, all (of equal power) were at greater geographical distances from appellant's station than were those removed from this frequency, or those already there at the time appellant's station was assigned to it. In view of the operation of appellant's station without complaint with two stations from two to three times closer to station WBCM than those which were assigned subsequently, it was reasonable to suppose no interference would result from such assignments, and the Commission was under no duty to notify appellant of such assignments.

Appellant attempts to show a reduction of the service area of his station after January, 1930, from a map based upon fan mail and six listening tests (R. 29, 30, 37, 39), made with a Western Electric 4-D Receiver which had not been calibrated (R. 40). What has heretofore been said with reference to reliability of such evidence to establish the original service area of his station is equally applicable here. (See Brief, pages 9 and 10.)

C. Assignments to the 1,410-kilocycle frequency now complained of by appellant were made over a period of more than two years without objection or protest by him

It should also be noted that the changes in assignments to the 1,410-kilocycle frequency now complained of were made over a period of more than two years up to the time appellant filed his application for modification of license, as amended, and that, as pointed out in our "Statement," at no time during said period or since was any appeal ever taken by appellant from any decision of the Commission granting any or all of these assignments or renewals thereof, nor did he make any protest thereof to the Commission or take proceedings in any manner to seek relief, except the filing of his application herein for modification of license requesting a change in frequency.

In this respect the case at bar differs materially from the *Journal Company case* (*Journal Company* v. *Federal Radio Commission*, — App. D. C. —; 48 F. (2d) 461), relied on by appellant, where an appeal was taken from each successive action of the Commission within the time allowed by Section 16 of the Radio Act of 1927, as amended.

Prior to July 1, 1930, no appeal would lie under Section 16 of the Radio Act of 1927 (44 Stat. 1169) from a decision of the Commission *granting* an application for license or renewal or modification thereof *of another station* assigned to the same frequency (*Journal Company* v. *Federal Radio Commission,* — App. D. C. —; 48 F. (2d) 461). Since that date, however, Section 16 of the Act has been amended (46 Stat. 844) so as to permit such an appeal within twenty days from the effective date of such decision or Order. Nevertheless, appellant did not appeal from any of the orders of the Commission of which it now complains, either within the time permitted by statute or at all.

Although appellant's witness, Ralph Carpenter, stated on cross-examination that station WBCM had been noticing interference on the frequency of 1,410 kilocycles since the beginning of 1930, no effort was made to remedy the situation (R. 44), notwithstanding the Commission's General Order No. 15[2] which provides for an orderly method of procedure in remedying interference conditions.

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[2] *General Order No. 15*

"For the purpose of providing an orderly method for the reduction and eventual elimination of interference between radio broadcasting stations operating on the same or on closely adjacent frequencies, the Federal Radio Commission announces the following procedure:

"At any time after July 15, 1927, any radio broadcasting station operating under license from the Federal Radio Commission may file with the Commission an affidavit certifying that unreasonable and injurious interference with its signals is being caused by the simultaneous opera-

It is respectfully submitted that even if appellant had had a cause of complaint in the first place (which we deny), he has slumbered on his rights and is now estopped from asserting any claims thereto. If appellant is permitted to appeal from actions of the Commission more than two years old, then any allocation made by the Commission since its inception is open to question by any or all stations desiring to do so.

2. The merits of the controversy

A. The Findings and Order of the Commission are amply supported by the record

The Commission found that if this application were granted, objectionable interference would result from the simultaneous operation of the applicant station as proposed and stations now on the

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tion of another radio broadcasting station, the name or call letters of which must be specified in the affidavit. The affidavit must likewise specify not less than two occasions on which such interference was observed, with the name and address of the person making each of such observations, the type of receiving set used, and the date and hour thereof.

"On receipt of such affidavit, and if in the judgment of the Federal Radio Commission the interference complained of is actually unreasonable and injurious to the affiant, the Commission will appoint a date for a hearing, at its convenience, will notify thereof the parties interested, and on the basis of the testimony presented at such hearing will order such changes of frequency, power, or hours of operation as may appear best to serve public interest, convenience, or necessity."

(This General Order was promulgated June 27, 1927, and remained in force until the Commission revised its Rules November 7, 1931, effective February 1, 1932.)

requested frequency, and also a station operating upon a frequency 20 kilocycles removed from that requested.

The only witness produced by appellant was Ralph Carpenter, Chief Engineer of Station WBCM. It appears from his testimony that he made seven observations during six consecutive nights in April, 1931, on a Western Electric and a Philco receiver (R. 35 to 37, inclusive, and R. 46) from which he concluded that no substantial interference would result (R. 37), although he stated that during the major portion of the time between 8 o'clock and midnight, when carriers were heard, there were two carriers detected, one of which was identified as WFIW, at Hopkinsville, Kentucky, the other being WDAY, at Fargo, North Dakota (R. 37, 46, and 47). If the carrier wave of two stations on 940 kilocycles can be detected in the Bay City area with apparatus not designed as a sensitive means of detecting interference, it is quite certain that interference would result from the operation of a station at Bay City on this frequency with a mileage separation of approximately one-half that generally considered necessary to prevent interference in the good service area.

Interference would be caused by the carrier wave at a far greater distance than the limits of its good-service area, producing a nuisance area that might be expected far greater than the service area. (R. 86.)

It is the opinion of the Commission's engineer (Ring) that the six tests made by appellant's engineer in April, 1931, are not sufficient to predict accurately what may happen during the greater portion of the year. (R. 87.)

Robert D. Linx, Chief Engineer of Station WFIW, Hopkinsville, Kentucky, was called as a witness in its behalf. He stated that in his opinion the operation of Station WBCM on 940 kilocycles would cause serious interference to station WFIW, WDAY, and WSCH, "and also terriffic interference to WBCM, as they are only 500 miles or so from WFIW and only slightly farther from WCSH and WDAY." (R. 67.) Linx stated that the section around Hopkinsville, Kentucky, is sparsely settled in the southern section, and the people depend mainly on radio for their entertainment. (R. 67.)

Edgar Felix, a radio engineer whose qualifications as such were conceded by appellant, testified on behalf of Station WFIW. He stated that he made an examination of the assignments on 940 kilocycles and that considering the average standard of allocation on regional channels the 940-kilocycle channel is one of the most satisfactory from a rural standpoint of any in the broadcast spectrum. He said that it is particularly fortunate, therefore, that it should be occupied by stations rendering an extensive and needed rural service, serving territories which do not have an excess of broadcast service. (R. 72 and 73.) It further appears from the testimony of this witness that the territory surrounding the stations now on this channel is distinctly rural in character, and it is his opinion that the granting of this application would involve a serious deprivation of the service to those now enjoying a useful signal from Station WFIW. (R. 75.)

Andrew Ring, sworn as a witness on behalf of the Commission, whose qualifications as a radio engineer in the employ of the Commission were accepted by all parties, stated that the recommended separation between a 1,000-watt station and a 500-watt station operating on the same frequency under average conditions at night, to prevent interference in the good-service area, is 1,050 miles and that the actual separation of appellant's station at Bay City, Michigan, and Station WFIW at Hopkinsville, Kentucky, is approximately half this distance. He said that if the usual station efficiencies and condition of propagations exist, it would be expected that interference would be had with the station operating on the proposed frequency, and also the present service area of Station WFIW would be limited. (R. 79.) This is likewise the opinion of William L. Foss, radio engineer in charge of Station WSCH, at Portland, Maine. (R. 100.) Ring testified further that the recommended separation between a 1,000-watt station and a 500-watt station, 20 kilocycles removed in frequency, for night operation, is 150 miles. The actual geographical separation between Bay City, Michigan, where appellant's station is located, and Station WWJ, at Detroit, Michigan, is approximately 95 miles, and that on the average receiver, under average propagation conditions that exist at night, cross-talk interference would be expected, limiting the good-service area of both stations. (R. 79.) Ring made no actual tests or surveys in the particular area but based his opinion to some extent on the official reports of the Department of Commerce, Radio Division, from which he has field strength measurements made of stations in this area. (R. 80.) It is his opinion that if this application is granted the good-service area of Station WFIW would be limited to that area bounded by a radius of 10 or 15 miles. (R. 84.) It also appears from Ring's testimony that even if this application were granted, appellant's station could not possibly accomplish a service area of 85 miles. (R. 86.) The good-service area of WBCM on 940 kilocycles would be a radius of approximately 6½ miles. (R. 83.)

William L. Foss, Chief Engineer for Station WSCH, Portland, Maine, testified on behalf of Station WSCH. His qualifications as a radio engineer were acknowledged by appellant. He stated that the State of Maine has approximately 30,000 square miles of territory and is inhabited by 800,000 people, many of whom live in scattered and isolated communities separated by long distances from the nearest railroad station and that these communities are dependent almost exclusively upon radio service for entertainment. (R. 89 to 91, inclusive.) It is his opinion that if the Bay City station (WBCM) were placed on 940 kilocycles, Maine would have no service from any station within its own borders. (R. 97.) He estimates that interference from WBCM, if permitted to operate on 940 kilocycles at night, would decrease the service rendered 675,926 people to a local service only, reduced to approximately 85,555 people. (R. 100.)

The frequency of 940 kilocycles is one of the frequencies allocated by the Commission's General Order No. 40 for use by not less than two nor more than three zones, except that in those cases where the station locations and powers are such that interference will not be caused four or five zones instead of three zones may share it where practicable. (R. 161.)

Since the locations and powers of the stations involved, according to the evidence adduced, are not such that interference will not be caused by simultaneous operation, the granting of this application would work a violation of this General Order.

B. This Court should sustain the Commission's Findings of Fact unless they are shown by the Record to be manifestly against the evidence

This proposition is fully sustained by the following cases: *Technical Radio Laboratory* v. *Federal Radio Commission,* 59 App. D. C. 125, 36 F. (2d) 111; *C. L. Carrell* v. *Federal Radio Commission,* 59 App. D. C. 131, 36 F. (2d) 117; *City of New*

York v. *Federal Radio Commission*, 59 App. D. C. 129, 36 F. (2d) 115; *Havens & Martin, Inc.*, v. *Federal Radio Commission*, 59 App. D. C. 393, 45 F. (2d) 295; *W. O. Ansley, Jr.*, v. *Federal Radio Commission*, — App. D. C. —, 46 F. (2d) 600; *General Broadcasting System, Inc.*, v. *Federal Radio Commission*, — App. D. C. —, 47 F. (2d) 426, in which this Court said: "The question at issue is one of fact which the Commission has decided after hearing all of the evidence. The present appeal calls upon this Court to determine whether the decision is manifestly against the evidence. If so, it should be reversed; if not, it should be affirmed." *Marquette University* v. *Federal Radio Commission*, — App. D. C. —, 47 F. (2d) 406, in which this Court said: "This case turns solely upon a question of fact, and inasmuch as the Commission is vested with authority to regulate the licensing of broadcasting stations in such a manner as to best subserve public interest, convenience, and necessity, the Court will hesitate to set aside a finding of the Commission unless it appears to be manifestly contrary to the evidence." *Reading Broadcasting Company* v. *Federal Radio Commission*, — App. D. C. —, 48 F. (2d) 458; *KFKB Broadcasting Association, Inc.*, v. *Federal Radio Commission*, — App. D. C. —, 47 F. (2d) 670; *Rev. John W. Sproul* v. *Federal Radio Commission*, — App. D. C. —, 54 F. (2d) 444; *W. E. Riker* v. *Federal Radio Commission*, — App. D. C. —, 55 F. (2d) 535; *Woodmen of the World Life Insurance Com-*

pany (Station WOW) v. *Federal Radio Commission,* — App. D. C. —, — F. (2d) — (decided February 29, 1932).

III. CONCLUSION

For the reasons set forth it is respectfully submitted that the Commission's decision should be affirmed.

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D. M. Patrick,
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Fanney Neyman,
Assistant Counsel.

U. S. GOVERNMENT PRINTING OFFICE: 1932

COURT OF APPEALS
DISTRICT OF COLUMBIA
FILED
FEB 25 1932
Henry W. Hodges
CLERK

IN THE

COURT OF APPEALS, DISTRICT OF COLUMBIA

October Term, 1931.

No. 5528.
(Special Calendar)

James E. Davidson, *Appellant*,

vs.

The Federal Radio Commission,
Congress Square Hotel Company, *Intervener*.

On Appeal From the Federal Radio Commission.

BRIEF FOR INTERVENER.

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Press of Byron S. Adams, Washington, D. C.

IN THE

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James E. Davidson, *Appellant*,

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The Federal Radio Commission,
Congress Square Hotel Company, *Intervener.*

On Appeal From the Federal Radio Commission.

BRIEF FOR INTERVENER.

This is an appeal from a decision of the Federal Radio Commission denying appellant's application for modification of license requesting a change in authorized frequency.

Appellant, James E. Davidson (described as "Bay City Broadcasting Association"), is licensee of broadcasting station WBCM, at Bay City, Michigan, acquired by him in 1928. Ever since the commission's general reassignment of November 11, 1928, WBCM has been licensed to operate at 1410 kilocycles, with power of 500 watts, unlimited time. Originally, there were four full time assignments to this frequency in addition to that of appellant, at distances from appellant's station ranging from 180 to 1130 miles. Three of these assignments were less than 600 miles away. Thereafter, two of these assignments were changed to other frequencies and three new assignments placed on appellant's frequency, at distances of from 480 to 960 miles (R. 283). At present, but two of the assignments are less than 600 miles away. The average distance from WBCM to other stations upon its frequency is now somewhat greater than formerly. The two closest stations, at 180 and 260 miles, still remain (R. 283).

It is contended by appellant that these changes in assignments have materially reduced the service area of his station. From the testimony of his engineer, it appears that the service area is severely limited (R. 27-35, opp. R. 114, R. 123-132).

These changes, it is contended, were made without giving appellant notice or opportunity to be heard.

Appellant has taken no appeal from the assignment of new stations to his frequency or from the renewal of any of their licenses. He has filed no protest or other appropriate pleading with the commission with reference to that frequency which might bring other stations assigned thereto into a proceeding for relief. He has confined his applications to requests for transfer to another frequency (R. 44).

This appeal arises from a specific application for assignment to 940 kc. Nothing more was asked of the commission in appellant's application (R. 13-16). At the hearing thereon, appellant's counsel, in opening, confined the issue to that request (R. 24-25).

For these reasons, neither the action of the commission in assigning other stations to appellant's frequency nor its failure to accord him "general relief" are now before the Court. *Technical Radio Laboratory v. Federal Radio Commission*, 59 App. D. C. 125, 129.

The sole question tendered is whether the commission erred as a matter of law in refusing to assign appellant's station to 940 kc. Upon that request, the burden of proof before the commission was upon appellant; the burden of showing error is upon him now and the "findings of fact by the commission, if supported by substantial evidence, shall be conclusive unless it shall clearly appear that the findings of the commission are arbitrary or capricious" (U. S. C., Title 47, sec. 96).

The commission denied appellant's application on findings that the proposed change in frequency, while it "would not result in any material improvement in service area" to appellant, would result in objectionable interference to stations WFIW, Hopkinsville, Kentucky, WDAY, Fargo, North Dakota and WCSH, Portland, Maine, all operating at the requested frequency and respectively 515, 690 and 680 miles from Bay City (R. 286-287, 79).

Concerning these stations, the Commission said that "they are located in sections of the country where their value to the public is largely dependent upon their ability to cover a large area and so reach a scattered rural population" (R. 287). Upon the basis of the finding of interference the commission held that the granting of appellant's application would violate General Order 40 of the commission, restricting the use of 940 kc. to not more than three of the zones created by the Radio Act of 1927 unless it can be shown that no interference would be caused by an additional assignment (R. 287). The frequency is now used in four zones and granting of appellant's application would increase this to five (R. 241).

Appellant contends that the commission's findings with regard to probable interference are "manifestly against the evidence" (Brief pp. 16-19). He bases this contention on the fact that his engineer testified that actual observations during six consecutive evenings in April, 1931, showed very low intensities of signal in the Bay City area from stations on 940 kc. and concluded therefrom that no substantial interference would result, whereas the testimony of four other witnesses indicating probable interference was largely expert opinion (Brief, pp. 17 ff.).

Even in the absence of the statutory presumption of correctness, the commission's findings upon conflicting testimony must be sustained upon appeal and that presumption precludes considerations of weight of the testimony and relative credibility of witnesses.

Moreover, it was shown at the hearing that the opinion of appellant's engineer in this regard was not significant. Although it is recognized that radio interference extends far beyond the area where programs may be heard, the apparatus used by the engineer in his tests was not designed as a sensitive means of detecting such interference (R. 87). Nevertheless impulses capable of causing interference were received in the Bay City area from stations on 940 kc. on each night of the tests (R. 114-122), but were not measured, the ear being relied upon (R. 43, 60-61). It was also shown that even under favorable interpretation of the tests, conditions on but six successive nights during the month of April do not give an adequate basis for predication as to what may happen during the greater portion of the year (R. 87).

Furthermore, it was shown that appellant's station at its present power and frequency is interfering greatly with WLEX, at Lexington, Massachusetts, and reducing its service area to a very few miles (R. 101).

If appellant's application were granted, a mileage separation of approximately one-half that generally necessary to prevent interference in the good service area of stations would be established on the 940 kc. channel (R. 79). This would reduce service to an area having a radius of approximately 6½ miles (R. 83). This "raises a substantial objection to the granting of appellant's application". *Ansley v. Federal Radio Commission*, 60 App. D. C. ——

WCSH, station of the intervener, Congress Square Hotel Company, was established in 1925. It represents an investment of $180,000 and is conceded to be an excellent station, maintained on high standards. It is the only station rendering consistent broadcast service in a large area surrounding Portland, Maine, having approximately 700,000 inhabitants (R. 99). Granting appellant's application would cut this service down until it would be available to but 85,000 of these (R. 100).

It is respectfully submitted that under these circumstances, the reversal of the decision complained of would be inconsistent with the many decisions of this Court condemning the doctrine that an individual broadcaster may seek benefits at the expense of the satisfied listening public in other areas of the country.

Respectfully submitted,

Bethuel M. Webster, Jr.,
Paul M. Segal,
Attorneys for
Congress Square Hotel Company, Intervener.

COURT OF APPEALS
DISTRICT OF COLUMBIA
FILED

MAR 25 1932

Henry W. Hodges
CLERK

IN THE

Court of Appeals, District of Columbia

No. 5528.

James E. Davidson (WBCM), *Appellant*,

vs.

The Federal Radio Commission
Congress Square Hotel Company, *Intervener*.

BRIEF FILED AMICUS CURIAE BY WFIW, INCORPORATED.

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IN THE

Court of Appeals, District of Columbia

No. 5528.

James E. Davidson (WBCM), *Appellant,*

vs.

The Federal Radio Commission
Congress Square Hotel Company, *Intervener.*

BRIEF FILED AMICUS CURIAE BY WFIW, INCORPORATED.

This appeal arises from a decision of the Federal Radio Commission denying an application for modification of Radio Broadcasting Station License filed by the appellant.

The appellant, James E. Davidson, (Known as Bay City Broadcasting Association) is the licensee of broadcasting station WBCM located at Bay City, Michigan. The license authorizes the station to operate on a frequency of 1410 kilocycles with a power output of 500 watts and unlimited time. Appellant filed with the Federal Radio Commission an application for modification of station license requesting a change from the frequency, 1410 kilocycles, to 940 kilocycles. This application was designated for hearing by the Commission, duly heard, and finally denied. From this denial of appellant's application by the Federal Radio Commission the appellant takes this appeal.

PROCEEDINGS BEFORE THE COMMISSION.

The Commission, having examined appellant's application, was not satisfied that public interest, convenience, and necessity would be served thereby and designated it for hearing. The Commission gave notice to all interested parties and framed the issues on which the hearing would be held (R. 16-18 incl.). These issues were as follows:

> "(1) The granting of this application may result in interference on this and adjacent frequencies.
>
> (2) Other related applications pending before the Commission."

All of the stations on the frequency of 940 kilocycles as well as stations on adjacent frequencies which might be affected together with other applicants having applications before the Commission were notified. The appellant received such notice, and, in accordance with the Rules and Regulations of the Commission, filed Appearance and Statement of Facts which he Expected to Prove.

The record does not disclose that at any point did the appellant object to the issues as framed in the Notice of Hearing. In the Appearance and Statement filed by the appellant (R. 19-21 incl.) the appellant attempted to inject other issues among them being the fact that certain reassignments by the Commission on the frequency of 1410 kilocycles had clearly injured the appellant. It is readily apparent that these changes were not a part of the appellant's application as presented to the Commission when it was designated for hearing, and were not the issues on which the hearing was held.

Although the appellant goes into great detail in his brief about the alleged unlawful actions of the Commission in destroying the service area of Station WBCM nowhere does it appear that the appellant at any time ever protested any of these actions nor took any legal steps as a result of such alleged illegal actions.

Granting for the sake of argument only that the Commission might have injured the service area of appellant station, WBCM, in its operation on 1410 kilocycles, it must certainly be conceded that the appellant had recourse to legal rights and remedies but did not avail himself of such rights or remedies.

Appellant's witness, Carpenter, admitted that no action was taken in protecting the assignment on 1410 kilocycles:

> "Q. Just a moment, I am talking about your own frequency. Have you tried to remedy that situation on your own frequency by getting the Court to decide it before this thing started?
>
> A. No, we have not." (R. 44)

Instead of protesting and taking legal steps to preserve its own rights appellant filed an application to operate on an entirely different frequency which is the instant application and case. It must certainly be conceded that there is no connection between the appellant's alleged injury and continued operation on 1410 kilocycles and the proposed operation on 940 kilocycles. Different stations are involved and the rights of different parties must be observed. The Commission took this into account because the following stations operate on 940 kilocycles. The power and distances from Bay City, Michigan, are herewith tabulated together with the engineering recommendation for mileage separation between the 940 kilocycle stations with present power and that proposed by the applicant, 500 watts. (R. 79.)

Station	Power	Distance	Recommended Distance
WFIW	1 kw.	515 mi.	1050 mi.
WDAY	1 kw.	690 mi.	1050 mi.
WCSH	1 kw.	680 mi.	1050 mi.

It will be noted that only 515 miles separate Bay City, Michigan, and Hopkinsville, Kentucky, where WFIW is authorized to operate, hence the interest of WFIW, Incorporated in this procedure.

Counsel for WFIW appeared at the hearing on appellant's application, introduced evidence, and cross-examined witnesses. As in all such questions of interference expert witnesses testified before the examiner, among them being witness Carpenter for the appellant, witness Linx and Felix for WFIW, witness Ring for the Commission, and witness Foss for Station WCSH, the intervener in this case. The qualifications of none of these witnesses were challenged and all were admited by the participants in the hearing.

Analyzing the situation, it is found that the witness for the appellant was the only witness who claimed that serious interference would not be created with the stations on 940 kilocycles. Four witnesses were in accord that serious interference would result. (R. 67, 69, 79, 100.) Witness Carpenter for the appellant, based his testimony upon certain tests that were made with receiving sets. He concluded that since he could not find field strength from stations on 940 kilocycles with an estimated value of more than one millivolt, no interference would be caused WBCM and neither would WBCM cause interference to stations on this frequency. The witness, however, admitted that this equipment was not field strength measuring equipment which had been carefully calibrated. (R. 40.) He depended upon determining the strength of the carrier waves of the 940 kilocycle stations by means of listening (R. 39) and if they were inaudible concluded the field strengths were less than one millivolt. (R. 40.) He did, however, detect and recognize the call letters of Station WFIW on certain occasions and at certain times. Two other experts agreed that this was neither a scientific nor satisfactory means of reaching conclusions such as those reached by witness Carpenter. (R. 76, 82, 95.)

With this testimony before the examiner he clearly found and recommended denial on the grounds that Stations WDAY, WFIW, and WCSH would be seriously interfered with and the service limited by heterodyne interference from WBCM if authorized to operate on 940 kilocycles. (R. 274.)

In the Commission's Statement of Facts and Grounds for Decision (R. 286-287) the Commission found that these same stations would be interfered with as follows: "(1) If this application were granted, objectionable interference would result from the simultaneous operation of the applicant station as proposed and stations now operating on the requested frequency." In addition, the Commission found that other interference would be caused. The Commission having duly heard the appellant on its application and made findings of fact, such findings are final unless the decision be manifestly against the evidence. It is submitted that the Commission's decision is justly supported.

POINTS RELIED ON BY APPELLANT.

Counsel for the appellant on Page 8 in his brief states the points on which he relies as follows:

> "1. Station WBCM has been subjected to a reduction of most of its normal and established service area by action of the Commission without notice and without hearing to appellant.
>
> "2. The Commission erred as a matter of law in shifting seven additional stations to the 1410 kilocycle frequency without notice to appellant and without an opportunity for it to be heard.
>
> "3. Appellant is clearly entitled to some form of relief from the Commission which will measurably reestablish it in the position occupied prior to the additional allocations."

APPELLANT'S FIRST POINT.

The first point relied upon by the appellant deals entirely with matter extraneous to the questions involved in this appeal. All of the stations involved in the alleged reduction of appellant's service area, if such did occur, operated on a frequency of 1410 kilocycles and not 940 kilocycles. If the appellant did suffer a reduction in service area he should have availed himself of legal remedies at the time such actions occurred, but appellant nowhere in his brief alleges that any protests were filed with the Commission nor any action taken in connection with the idea of preserving this service area.

Appellant cites on Page 11 of his brief the case of Technical Radio Laboratories vs. Federal Radio Commission (36 Fed. (2nd) 111-115) and that "this Court has determined that radio broadcasting is subject to regulation as a form of interstate commerce." Such truly is the case, however, appellant does not cite this case to show that one of the main issues involved was whether or not the Court could determine issues which were not before it. In that particular case this Honorable Court held that on an appeal from the Radio Commission's refusal to renew a broadcasting license the reviewing court could not consider questions of modification of license, in other words, could not consider questions extraneous to the direct issues presented. Also in this same case, this Honorable Court stated, "this Court should sustain the Commission's decision unless it is shown by the record to be manifestly against the evidence." The appellant's first point does not allege that the Commission's decision in denying his application is manifestly against the evidence.

In the appellant's brief on Page 11 the case of Journal Company vs. Federal Radio Commission (48 Fed. (2nd) 461) is cited in the following respect: "This Court has determined that the purpose of this regulation is to prevent chaos and insure satisfactory service". It is submitted that the purpose of the

Commission's decision in the instant case is to prevent undue interference with stations on the frequency of 940 kilocycles. The Commission is amply justified in reaching such a conclusion as based upon the testimony of three expert witnesses. See:—Reading Broadcasting Co. vs. Federal Radio Commission (48 Fed. (2nd) 458).

It is further submitted that in the Journal case, as cited by the appellant, the Journal Company took every step in order to protect its service area, and that in this respect this case is materially different from that of the Journal case (Journal Company vs. Federal Radio Commission (48 Fed. (2nd) 461).

The appellant next cites the case of Saltzman vs. Stromberg-Carlson Telephone Manufacturing Company (46 Fed. (2nd) 612). True enough in that case the Commission ordered a change in the frequency of that appellant's broadcasting station without prior notice or opportunity for hearing, but that appellant immediately proceeded to perfect a legal remedy for the protection of its service area without waiting or applying for another frequency as this appellant has done.

The differences, therefore, between the cases as cited by the appellant are such as to make them ruling and deciding cases against this appellant.

APPELLANT'S SECOND POINT.

The second point raised by the appellant on Page 9 of his brief, "The Commission erred as a matter of law in shifting seven additional stations to the 1410 kilocycle frequency without notice to appellant and without an opportunity for it to be heard", is entirely extraneous to and not a proper part of this case. It has no bearing whatsoever on whether or not the Commission's decision in this case should be sustained. It was clearly established by competent witnesses at the hearing accorded this appellant that serious interference would be caused with the stations operating on 940 kilocycles if the application of the appellant were granted. Because the Commission may have erred as alleged by the appellant in placing other stations on his operating frequency of 1410 kilocycles does not override this point. This Court has held that where serious interference would be created it is a serious objection to the granting of the application.

Reading Broadcasting Company vs. Federal Radio Commission (48 Fed. (2nd) 458) "We have examined the evidence contained in the record, and we think it sufficiently sustains these findings; it consists in part of the testimony of competent engineers, which is entitled to weight; and there is but little contradiction of it in the record. Under the rule expressed in Technical Radio Laboratories vs. Federal Radio Commission the findings of the board should in such a case be sustained." See also:—Ansley vs. Federal Radio Commission (46 Fed. (2nd) 600).

In argument on appellant's second point three cases are cited, Journal Company vs. Federal Radio Commission (48 Fed. (2nd) 461), Chicago Federation of Labor vs. Federal Radio Commission (41 Fed. (2nd) 422), and Reading Broadcasting Company vs. Federal Radio Commission (48 Fed. (2nd) 458).

This appellant contends that he, like the Journal Company, was injured by alleged illegal actions on the part of the Commission in changing the frequency and increasing the power of other stations on the frequency on which his station operates. As far as this appellant is concerned this may or may not be true. However, a distinguishing feature which prevents the Journal Company case from being applicable in this case is that the Journal Company took advantage of an opportunity to protect its assignment by taking appeals from the decision of the Commission as complained of, whereas, this appellant did not.

The right of appeal in any such case is purely statutory. And whether or not the acts of the Commission as complained of by this appellant could be appealed under the existing act at that time is not properly a part of this case. Certainly by no sound line of reasoning can it be argued that the service of innocent stations on an entirely different frequency should be injured because, as alleged by the applicant, his service area on 1410 kilocycles has been injured. Such a conclusion can only be reached by justifying one wrongful act on an alleged previous wrongful act. "Two wrongs never made a right."

The Chicago Federation of Labor case is not in point with this case. In that case the Chicago Federation of Labor applied for the facilities of two other stations. The question of interference did not arise at all. Furthermore, in this case this Honorable Court said, "It is not consistent with true convenience, interest, or necessity that meritorious stations like WBBM and KFAB should be deprived of broadcasting facilities, when one is granted to them, which they have at great cost prepared themselves to exercise unless clear and sound reasons of public policy demands such action". Under such phraseology it is submitted that there is no compelling reason in this case why the service of the stations on 940 kilocycles and especially WFIW should be unnecessarily injured.

The uncontradicted testimony of witness Ring shows that the good service area of WFIW would be curtailed to not more than ten or fifteen miles if the appellant's application should be granted. (R. 84)

APPPELLANT'S THIRD POINT.

In the appellant's third point on Page 15 of his brief, Counsel alleges that the appellant "is clearly entitled to some form of relief from the Commission which will measurably reestablish it in the position occupied by it prior to the erroneous actions by the Commission". The appellant subdivides this into the specific relief requested or general relief in the nature and circumstances of the application. The only case cited in support of this contention is the Journal case. It has already been pointed out previously that the Journal case is not applicable herein as the appellant did not perfect any legal remedies in regard to the alleged illegal actions of the Commission.

Furthermore, this third contention of the appellant seems to be based upon equitable grounds rather than legal grounds. Such being the case, this Court stated its opinion as follows: "The right of appeal being a statutory one, the Court cannot dispense with its express provisions even to the extent of doing equity." Universal Service Wireless, Incorporated vs. Federal Radio Commission (41 Fed. (2nd) 113-115). All of this third point, however, being predicated upon equitable grounds, must turn upon the point of whether or not this appellant has slept upon his rights. Nowhere does this appellant allege that he has been vigilant in protecting his rights, and certainly equity protects the vigilant. If the appellant's third point is to be upheld, then, he must certainly not be guilty of laches. Not only does this appellant fail to allege that he is not guilty of laches, but witness Carpenter, as already cited, admits this guilt.

CONCLUSION.

It is submitted that there are no material points of law involved in this case. The only question presented to the Commission by this appellant's application was whether or not public interest, convenience, and necessity would be served by the granting thereof. The Commission duly heard the case with proper notice to all parties, and, having considered the questions involved, denied the application upon questions of fact. After such a decision an appeal was taken by this appellant. It is clearly apparent, therefore, that the only questions presented to this Court by this appeal are questions of fact on which the Commission has duly passed.

This Court has already laid down a well established rule that it would not disturb the decision of the Commission based upon questions of fact unless it was clearly shown that the decision of the Commission was manifestly against the evidence. Technical Radio Laboratories vs. Federal Radio Commission (36 Fed. (2nd) 111), C. L. Carrell vs. Federal Radio Commission (36 Fed. (2nd) 117), City of New York vs. Federal Radio Commission (36 Fed. 115, Havens and Martin vs. Federal Radio Commission (45 Fed. (2nd) 295), W. O. Ansley, Jr. vs. Federal Radio Commission

(46 Fed. (2nd) 600), General Broadcasting System, Inc., vs. Federal Radio Commission (47 Fed. (2nd) 426,) Marquette University vs. Federal Radio Commission (47 Fed. 406), Reading Broadcasting Company vs. Federal Radio Commission (48 Fed. (2nd) 458), KFKB Broadcasting Association vs. Federal Radio Commission (47 Fed. 670), John W. Sproul vs. Federal Radio Commission (54 Fed. (2nd) 444), W. E. Riker vs. Federal Radio Commission (decided December 21, 1931), Woodmen of the World Life Insurance Company vs. Federal Radio Commission (decided February 29, 1932).

The position of the appellant in this case in trying to make it coincide with the Journal case is entirely unsupported, because, in relying on this case the appellant subjects himself to the statutory provisions of the Radio Act of 1927, as amended, and, in so doing, he must admit that he has slept on his rights and been guilty of laches.

In trying to invoke equitable remedies it is quite apparent and undeniable that if the position of this applicant should be maintained, then, every broadcaster in the United States could file an application for modification of license and inject questions of alleged erroneous actions on the part of the Commission even back to the time that the Commission was organized in 1927. A broadcaster could now claim that under the general reallocation of November 11, 1928, he did not receive fair, equitable, and legal treatment at the hands of the Commission even though he did not protest or take any legal steps to support his claim. Such a condition could only result in chaotic conditions and to the detriment of radio broadcasting in general.

It is submitted that the decision of the Commission should be upheld and the appeal of this appellant denied.

Respectfully submitted,

Geo. O. Sutton,
Attorney for WFIW, Inc.